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ABSTRACT

This document presents an interdisciplinary curriculum in ecology and social studies for the K-12 grade level. Topics include: (1) A Model Strategy; (2) Participatory Citizenship; (3) Graphic Studies; (4) Globescope Matrices; (5) Nurturing an Environmental and Social Ethic; (6) Unit Outline; and (7) Lesson Design Format. Ecology lesson plans are as follows: (1) Flora and Fauna; (2) Sensing the Lifespace Environment; (3) Introduction to Ecology; (4) Defining the Environment; (5) Natural Resources; (6) Nature in Art, Music, and Literature; (7) Earth's Carrying Capacity; (8) Habitat and Species; (9) Biome: Deserts; (10) Biome: Mountains; (11) Biome: Rainforests; (12) Biome: Wetlands; (13) Environmental Engineering; (14) Pollution; (15) Land Use: Policies and Practices; (16) Sustainable Development; (17) Conservation and Stewardship; and (18) Understanding the Hydrosphere. (YDS)

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HELPING STUDENTS DEVELOP A 21ST CENTURY ENVIRONMENTAL & SOCIAL ETHIC

Richard Oakes Peters, Ed. D.
Environmental Education Curriculum Architect

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INTRODUCTION

Twenty first century citizens must be aware of- and sensitive to the plight of Nature, and to the effects that ***environmental degradation*** have upon the quality of human life on earth.

Today's children and adolescents must be formally introduced to - and directly involved in environmental studies that are grounded in concepts, subject specific knowledge, and related academic and intellectual skills gleaned from across the Kindergarten through Grade Twelve curriculum. The focus of **ECO/SOCIAL Studies** should be on Earth's ***ecosystem*** and Man's place in Nature's scheme.

ECO/SOCIAL Studies is an interdisciplinary curriculum design that provides for the *continuous, integrated, sequential* **acquisition, application, reinforcement** (continuous application), **refinement** (mastery or proficiency) of knowledge and skills -- providing the basis for lifelong learning.

An ***environmental ethic*** is an individual's conscious awareness of the character of Nature's ***biosphere***; atmosphere, geosphere, and hydrosphere, and the ways that Man benefits from Nature -- as he creates ***built environments*** and designs cultural lifestyles (***social ethic***).

COOPERATIVE LIVING HABITATS exist in geographical locations where MAN & NATURE coexist and mutually prosper from their associations. We must not forget that MAN & NATURE are, in fact, inextricably connected -- regardless of whether Man recognizes this connection or chooses not to acknowledge this inescapable fact.

ENVIRONMENTAL RIFT occurs in geographical settings where MAN & NATURE do not coexist but rather compete for survival. Most RIFT situations are Man-made; occasions when Man attempts to alter, dominate, or manipulate aspects of Nature's realm -- in order to environmentally engineer the landscape and to affect irreversible change in the quality of the lifespace environment.

Another aspect of an individual's ***social ethic*** is an understanding that responsible citizenship is a learned way of living -- the result of years of citizenship skills development that characterized the K-12 curriculum in **all** academic and non-academic learning encounters. ***Citizenship-by-doing*** training is the key to responsible citizenship in later life.

A blending of one's environmental ethic and social ethic forms the basis for: perceiving MAN/NATURE relationships that exist nearby/close to home as well as distant/far-removed, understanding MAN's place in NATURE's scheme, critically analyzing conditions and situations that exist between natural and ***built*** environments, a concern for the plight of NATURE, and proactive behavior taken in order to resolve conflicts, clarify issues, remediate problems, and create quality lifespace environments.

There is a need for grade-level teacher teams to design an array (menu) of classroom and field-based **learning encounters** that ensure students' citizenship skills development and repeated appliaction across the curriculum -- in all subjects -- all day long -- every school day!

Citizenship should be defined by thoughts and actions rather than by discussions of abstract, and oftentimes meaningless, theories. Students cannot remain passive on-lookers in the game of *everyday life*. Direct experiences in the real world -- dealing with real world issues and problems, provide students the opportunity to think critically, to make decisions, and to solve problems.

As a result of a curriculum-based ***citizenship training program***, students are able and willing to right wrongs, to make personal sacrifices, and contribute their expertise and talents in efforts to solve perplexing problems that impact upon the environment and society. **An environmental and social ethic is grounded in *concern* and *action*.**

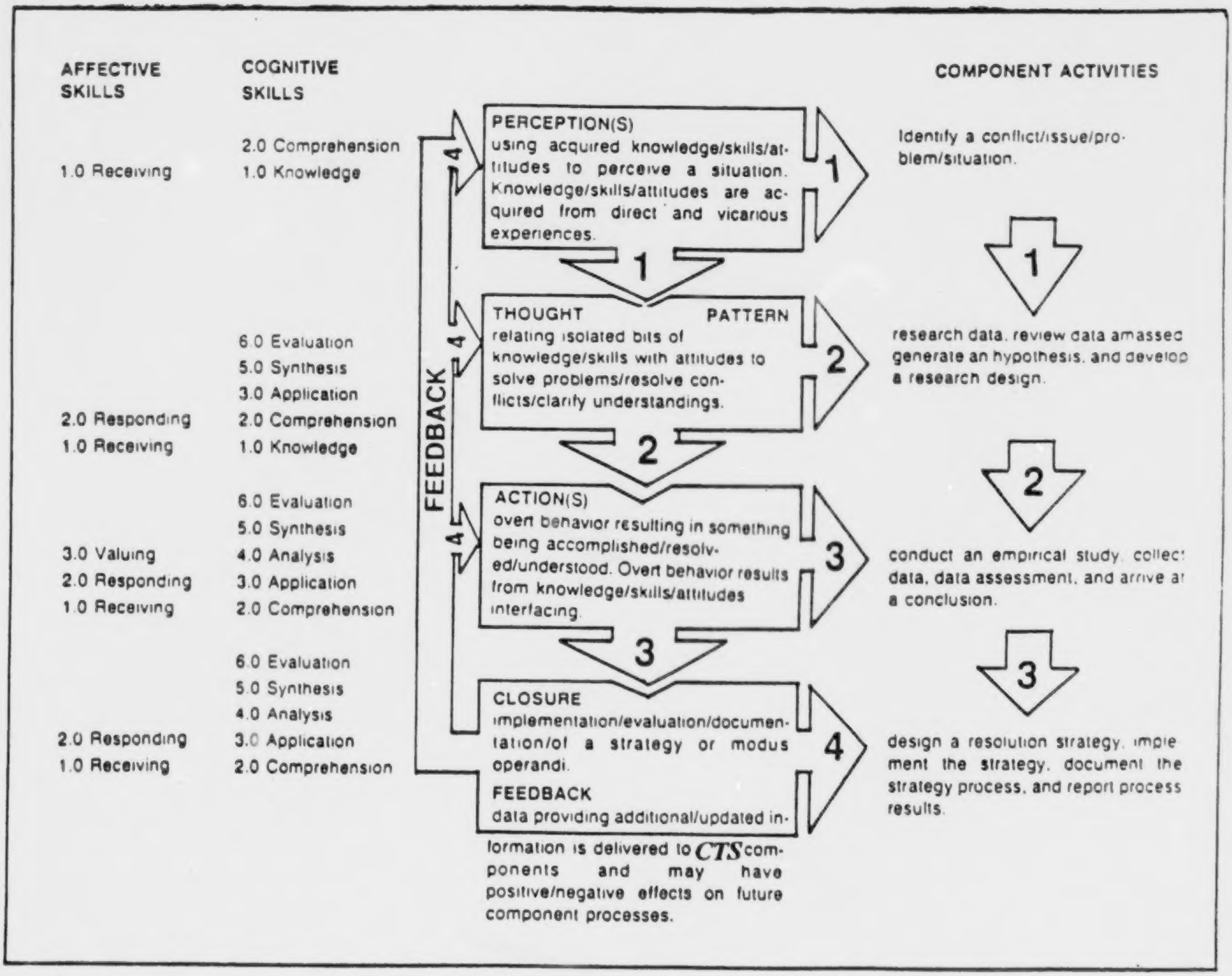
2

A MODEL STRATEGY

Direct student involvement in the education process requires that they develop and apply intellectual skills (critical thinking, decision-making, problem solving) to *real life* (field-based) and *real-to-life* (classroom-based) scenarios.

The CRITICAL THINKING STRATEGIES (*CTS*) Model **is a schema that can be used to enhance students' intellectual skills development, and to actively involve them in situations that demand *proactive behavior* -- when it comes to confronting issues and situations and solving conflicts and problems that affect MAN and NATURE. (SEE FIGURE I)**

FIGURE 1 *CRITICAL THINKING STRATEGIES (CTS)* Model


AFFECTIVE SKILLS
COGNITIVE SKILLS
COMPONENT ACTIVITIES
2.0 Comprehension
1.0 Receiving
1.0 Knowledge
6.0 Evaluation
5.0 Synthesis
3.0 Application
2.0 Responding
2.0 Comprehension
1.0 Receiving
1.0 Knowledge
6.0 Evaluation
5.0 Synthesis
3.0 Valuing
4.0 Analysis
2.0 Responding
3.0 Application
1.0 Receiving
2.0 Comprehension
6.0 Evaluation
5.0 Synthesis
4.0 Analysis
2.0 Responding
3.0 Application
1.0 Receiving
2.0 Comprehension
FEEDBACK
4
4
4
1
2
3
4
1
2
3
1
2
3

PERCEPTION(S)
using acquired knowledge/skills/attitudes to perceive a situation. Knowledge/skills/attitudes are acquired from direct and vicarious experiences.

Identify a conflict/issue/problem/situation.

THOUGHT PATTERN
relating isolated bits of knowledge/skills with attitudes to solve problems/resolve conflicts/clarify understandings.

research data, review data amassed generate an hypothesis, and develop a research design.

ACTION(S)
overt behavior resulting in something being accomplished/resolved/understood. Overt behavior results from knowledge/skills/attitudes interfacing.

conduct an empirical study, collect data, data assessment, and arrive at a conclusion.

CLOSURE
implementation/evaluation/documentation/of a strategy or modus operandi.

FEEDBACK
data providing additional/updated information is delivered to *CTS* components and may have positive/negative effects on future component processes.

design a resolution strategy, implement the strategy, document the strategy process, and report process results.

From *PROCESS INDUCTION* © 1994 Richard Oakes Peters, Ed.D.

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Stewardship of Nature's resources requires proactive commitment to proposals, policies, and actions taken -- in order to ensure the continued good health and well-being of Earth's biosphere.

Cloaked in one's overt commitment to Nature is an on-going process of critical thinking, decision-making, and problem solving.

Throughout the several grades, and across the curriculum, students must be introduced to intellectual skills training, and provided with opportunities to apply these skills to real life and real-to-life situations.

Critical thinking, decison-making, and problem solving should not be limited to classroom and school-wide activities. Instead, intellectual skills must be acquired and applied in field-based settings as well as within the walls of the school.

The total *lifespace environment* (which constitutes the real world) must play a central role in preparing students to become 21st century proactive citizens. All students must realize that the foundation for learning process taking place in school is the vehicle for lifelong involvement in the learning process; whether opportunities arise from printed sources, the Internet, personal experiences, and/or through interaction with the people, places, things, events, and processes that comprise the context of our singular and collective lives.

Appearing in the literature from 1978 through 1996, this author's published remarks focused on strategies to:

I. *Affect students' awareness*

PROGRESS TOWARD A GLOBAL PERSPECTIVE OF ENVIRONMENTAL QUALITY: *Strategies to Affect Student Awareness of the Environment*
ERIC 1978 ED 157 689

"Putting **Global 2000** To Work In The School Curriculum,"
Environmental Education Report January 1981

"Developing the Concept of Cooperative Living Habitats,"
The Social Studies Teacher February-March 1983

"HELPing Students Perçeive the Global Community,"
Contemporary Education Winter 1985

"Enhancing the Global Perspective of Middle School Students,"
Southern Social Studies Quarterly Spring 1990.

II. *Nurture Students' Intellectual Skills Development*

TEACHING STUDENTS TO BE PROACTIVE CHANGE AGENTS IN A GLOBAL AGE
ERIC 1981 ED 207 952

"Proactive Students in Global Education," ***The Social Studies Teacher*** March-April 1982

TWENTY-FIRST CENTURY TECHNOLOGY AND THE GLOBAL ENVIRONMENT: *Developing A Cause & Effect Relationship Perspective Among Proactive Action Students*
ERIC 1982 ED 213 592

DEVELOPING PROACTIVE ACTION STUDENT AWARENESS ABOUT - AND NEED FOR GLOBAL ENVIRONMENTAL STEWARDSHIP
ERIC 1983 ED 216 905

DEVELOPING STUDENT SENSITIVITY ABOUT INTERLOCKING DEPENDENCY IN NATURAL & SOCIAL ENVIRONMENTS
ERIC 1986 ED 261 831

"Modeling for Effective Skills Development," ***The Social Studies Teacher*** September-October 1986

"A Modeling Strategy to Affect Critical Thinking and Decision-Making Skills Development Among Proactive Action Students," ***The Master Educator*** Winter 1988

MODELING TO ENHANCE CRITICAL THINKING AND DECISION-MAKING SKILLS DEVELOPMENT IN THE INSTRUCTIONAL PROCESS
ERIC 1989 ED 287 781

"ECOnaut Training," ***Teachers Clearinghouse for Science and Society Education*** **Newsletter** Winter 1994

PROCESS INDUCTION: *Researching Skills Development Across the Social Studies Curriculum*
ERIC 1995 ED 374 047

III. *Enhance Intellectual Skills Application to Real Life and Real-to-Life Situations*

ENHANCING STUDENT AWARENESS OF & EXPOSURE TO THE GLOBAL ENVIRONMENT THROUGH EXTRA-CURRICULAR SOCIAL STUDIES ACTIVITIES
ERIC 1990 ED 315 355

ECO/SOCIAL STUDIES AND COMMUNITY-CENTERED LEARNING
ERIC 1994 ED 365 602

PARTICIPATORY CITIZENSHIP: *A Learned Way of Living*
ERIC 1994 ED 369 676

LEARNING BY DOING IN REAL LIFE & REAL-TO-LIFE SITUATIONS
ERIC 1996 ED 380 359

Focusing on Participatory Citizenship

The goals of AMERICA 2000 guide parents, business leaders, and communities-at-large in creating educational programs that will help today's students.

by Richard Peters

Citizenship is not a course, but a learned way of living.

All across this nation, local communities and state governments are designing plans to enhance the readiness of children and youth for 21st century living.

Using AMERICA 2000 goals as a guide, concerned parents, business leaders, elected officials, and communities-at-large are creating educational programs that will help today's students function as productive citizens in tomorrow's world.

AMERICA 2000's Goal III focuses on the need for students to use their minds well, so they are prepared for responsible citizenship. According to the National Education Goals Panel (1992), community service is an area of individual preparation often times not planned for in the typical curriculum.

While Austin's PROJECT A+ program emphasizes young adults being able to demonstrate social responsibility and active involvement in community service, most secondary curricula do not set such lofty goals. Too often, it is believed that good citizens happen as a result of a study of national/state history and national/state government. Knowing how a bill becomes law and how the President of the United States is elected does *not* guarantee that students will become productive members of the society and proactive citizens. Something more is needed!

Participatory Citizenship

What is needed in the school curriculum, are ample opportunities for all students to acquire and apply citizenship skills both in the classroom and within the community.

Students need involvement with citizenship skills development in all subjects – not just in social studies classes! Thus, there is a need for teacher teams to design activities and experiences that will insure that students practice good citizenship everyday – all the time. Good citizenship should be perceived, by students, as something that permeates their lives – and not something to be discussed in history or government classes. Citizenship should be defined as actions and not as the discussion of abstract theories!

Students need exposure to conflicts, issues, problems, and situations that have both immediate and long-range impact upon the lives of individuals and groups.

Students cannot remain passive onlookers in the game of everyday living. They must be trained in active involvement with processes that require commitment and individual responsibility to the betterment of the state of human affairs. They must be able and willing to right wrongs, to make critical decisions and sacrifices and contribute to the solution of perplexing social problems.

Richard Peters is professor of Education, Corpus Christi State University.

A Plan of Action

Beginning in the lower elementary grades, children need to participate in activities that focus their attention and development skills on social issues that directly affect them. They need exposure to the community-at-large and to everyday living.

By the middle school years, children and youth have become acquainted with real life situations that require action on the part of concerned citizens. They participate in community-oriented activities that require them to work cooperatively with others.

In high school, youths are involved in activities that build upon earlier experiences, and that require them to apply acquired knowledge and skills to perceived situations. For example:

- participate in community/school clean-up campaigns;
- get out the vote by baby-sitting, going door-to-door reminding individuals to vote, and driving voters to the polls;
- volunteer energy and time to peer tutoring in school, and helping adults learn to read at community centers;
- serve as BIG BROTHERS/ BIG SISTERS;
- man a crisis hotline telephone;
- write a column in the local newspaper;
- work in a hospital;
- communicate with local/area/state/national elected officials on matters of concern and interest;
- participate in walk-a-thons and bike-a-thons;
- be an advocate for some social action; and
- organize community awareness programs.

The products of PARTICIPATORY CITIZENSHIP programs are proactive individuals who act for the betterment of the group. They accept responsibility for personal behavior, and conduct themselves within the framework of the law.

Citizenship is not a course! It is not an academic exercise but rather a learned way-of-living! Citizenship skills can only be acquired and honed by actually participating in activities, both in the school and community, that require commitment, reasoned thought, and action.

(Continued)

Citizenship ...

Working with community resource people, teachers can design a curriculum that provides for both subject matter-related activities and extra-curricular projects. Site-based management teams should engage the concerns and expertise of individuals and groups that function within the community. Community resource sites can become citizenship skills training 'classrooms' – as students participate in activities related to real life challenges. Such activities can enhance critical thinking, decision-making, and problem solving skills among high school students.

ECOnauts

An example of citizenship training might involve students in activities designed to enhance the quality of the environment of the local community.

As defined by this author, ECOnauts are explorers of the world(s) around them. They are researching scientists who interact with natural and social phenomena.

These nature-sensitive individuals are aware of the natural world around them; are informed about past and present conflicts, issues, problems, and situations related to natural environments; have empathy for the plight of nature – locally, regionally, nationally, and internationally; understand the characters of diverse natural environments that are nearby/close-to-home and distant/far-removed; have developed attitudes and opinions about ecology-related issues in contemporary life; perceive relationships between humans and nature; and are committed to pro-active action.

In classrooms, students would be involved in teacher team-planned activities that focus attention on conflicts, issues, problems, and situations that require citizen action.

As extra-curricular activities, ECOnaut club members would be involved in community service projects. Working with community resource people, club advisors design projects that enable students to demonstrate the ability to reason, to apply knowledge, and to solve problems.

Being a good citizen is a lifelong process involving skills development and application everyday of our lives! Citizenship is not part of the curriculum – it is the essence of the curriculum!

GRAPHIC STUDIES

An important component of ***ECO-teach* Lesson Plans** is students' use of *graphic media devices* (8mm/16mm motion picture cameras, still photography cameras, videotape equipment).

This author has incorporated graphic studies into instructional units and daily lesson plans since the mid-1960s. Published reference to this hands-on learning strategy include:

"The Mobile Classroom Concept," ***Audiovisual Instruction***
April 1970

"Investigation With A Camera," ***The Maine Teacher***
February 1971

"Graphic Studies for Environment Enrichment in the Social Studies,"
Deltagram March 1971

"The Graphic Studies Approach," ***Audiovisual Instruction***
April 1971

"Environmental Enrichment and Media," ***Educational Technology***
October 1971

"Graphic Studies: The Elderly in the Community," ***Social Education***
October 1972

STRATEGIES TO AFFECT STUDENT AWARENESS OF NATURAL AND SOCIAL ENVIRONMENTS IN OUTDOOR EDUCATION
ERIC 1974 ED 092 300

THE UTILIZATION OF COMMUNITY RESOURCES FOR STUDENT LEARNING ***ERIC*** 1976 ED 125 813

HOW TO TAKE THE CLASSROOM OUT INTO THE ENVIRONMENT
ERIC 1976 ED 125 856

THE COMMUNITY, THE SOCIAL STUDIES, STUDENT ENVIRONMENTAL AWARENESS ***ERIC*** 1976 ED 125 956

"The NEW Spirit of St. Louis," ***Environmental Education Report***
January 1977

MAN IN HIS WORLD *ERIC* 1978 ED 144 790

"Developing the Concept of Cooperative Living Habitats,"
The Social Studies Teacher November 1982

"HELPing Students Perceive the Global Community,"
Contemporary Education Winter 1985

"Introducing Students to the Global Community," ***Teaching K - 8***
February 1991

"Developing a Sense of SELF in Lifespace Environments,"
Global Connection Winter 1993

HUMANS, NATURE, PLACES, THINGS: AN **ECO/SOCIAL STUDIES** VIEW OF THE WORLD *ERIC* 1994
ED 363 559

ENVIRONS: LIVING IN NATURAL AND SOCIAL WORLDS
ERIC 1994 ED 372 014

"Investigating Environmental Rift," ***Teachers Clearinghouse for Science and Society Education Newsletter***
Winter 1995

ENVIRONMENTS: THE CONTEXT OF OUR LIVES *ERIC*
1995 ED 374 048

UNDERSTANDING ENVIRONMENTAL RIFT: AN **ECO/SOCIAL STUDIES** APPROACH *ERIC* 1995 ED 374 049

"Environmental Education in Urban Communities,"
Schools in the Middle September - October 1995

LEARNING BY DOING IN **REAL LIFE** AND **REAL - TO - LIFE** SITUATIONS *ERIC* 1996 ED 380 359

Throughout the grades, students work with community resource people (e.g., commercial photographers, amateur photographers, local/area television news cameramen, television studio cameramen, newspaper photographers) and building-

11

level teachers -- to learn how to operate graphic media devices, to learn how to use graphic media devices in conjunction with field-based studies, to learn filming and videotaping techniques (e.g., framing the subject, exposure settings, angles).

Local/area artists and building-level art teacher(s) discuss filming/taping-related topics with students: *composition, lighting/shading, texture* (etc).

Beginning in the lower elementary grades, and through grade twelve, students have repeated opportunities to use graphic media devices: 1) to collect data, 2) as a medium of artistic expression, and 3) as a medium of communication.

GLOBESCOPE MATRICES

Globescope Lifespace Matrix: **Natural Environments**

Working in small research groups, and using print/nonprint materials as well as CD-ROM software and Internet web sites, students collect data relevant to the Environ/Region chosen by each group. Data is placed on matrix cards and affixed to the matrix board -- in the appropriate Characteristics columns. When all research groups have affixed their data cards to the matrix board -- students visually compare and discuss the differences and similarities among diverse Environs/Regions. (SEE FIGURE II)

Globescope Culture Matrix: **Social Environments**

Working in small research groups, and using print/nonprint materials as well as CD-ROM software and Internet web sites, students collect data relevant to the Culture chosen by each group. Data is placed on matrix cards and affixed to the matrix board -- in the appropriate Traits columns. When all research groups have affixed their data cards to the matrix board -- students visually compare and discuss the differences and similarities among diverse Cultures. (SEE FIGURE III)

Because humans and nature are inextricable entities sharing a common global lifespace, natural and social (human-made) environments are interactive and interdependent. Lifespace phenomena (e.g., people, places, things, events, and processes) exist in a perpetual state of interlocking dependency. Environmental rift occurs when humans and nature cannot coexist in cooperative living habitats; failing to mutually benefit from their associations.

NATURE SENSITIVE students :

1. are aware of the natural world around them
2. are informed about past and present conflicts, issues, problems, and situations related to natural environments
3. have empathy for the plight of nature
4. understand the character of diverse natural environments that are nearby/close to home and distant/far-removed
5. have developed attitudes and opinions about ecology-related issues in contemporary life
6. perceive relationships between humans and nature

GLOBESCOPE Lifespace Matrix: Natural Environments

CHARACTERISTICS

Environs/Regions	1	2	3	4	5	6	7	8	9	10
Coastal Plains										
Deserts										
Forests										
Interior Plains										
Jungles										
Mountains										
Polar Zones										

1. Area (acres, hectares, square miles)
2. Climate (temperature and weather conditions)
3. Ecology (relationships between living organisms and the geographical environment)
4. Fauna (animals)
5. Flora (plants)
6. Geographical location (physical position on a globe or map and/or distance from other places)
7. Resources (minerals, timber, vegetation, and wildlife)
8. Seasons (differences in amounts of daylight, plant growth, precipitation, and temperature)
9. Topography (surface features of Earth)
10. Water Supplies (ground water, plants, and precipitation)

Excerpts from ENVIRONS: LIVING IN NATURAL AND SOCIAL WORLDS, © 1993, Richard Oakes Peters

FIGURE II

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In the 21st century, the day-to-day lives of people, in all nations, will be influenced by increased cross-cultural links. Individuals will be required to understand and interact with people, cultures, languages, lifestyles, and value systems that differ from their own.

CULTURE LITERATE students 1) are aware of the human-made world around them, 2) are informed about past and present conflicts, issues, problems, and situations related to social environments, 3) have empathy for the plight of diverse social groups and cultures, 4) understand the character of social environments that are nearby/close to home and distant/far-removed, 5) have developed attitudes and opinions about culture-related issues in contemporary life, 6) perceive relationships among diverse social groups and cultures, 7) recognize the differences and similarities among the traits of divers cultures, and 8) are committed to action - in order to resolve conflicts, clarify issues, solve problems, and better understand complex situations.

FIGURE III

GLOBESCOPE Culture Matrix: Social Environments

TRAITS

CULTURES	1	2	3	4	5	6	7	8	9	10	11
A											
B											
C											
D											
E											
E											
F											
G											

1. Food/Diet
2. Shelter (types/materials)
3. Dress/Costumes
4. Art/Dance/Music
5. Family (structure/functions)
6. Government (structure/functions)
7. Religion (structure/functions/sacred objects and sites)
8. Division-of-Labor (specializations/training)
9. History (events/personalities/sites)
10. Technology (tools/weapons/machines)
11. Ecology (relationships between human beings (SOCIAL) and with the geographical environment (NATURAL)
12. Communication (alphabet, symbols, forms, drums, sign language, art work)

Excerpts from ENVIRONS: LIVING IN NATURAL AND SOCIAL WORLDS, Richard Oakes Peters © 1993.

IF an **ECO/SOCIAL Studies** program of environmental awareness and participatory citizenship is to be effective -- in the daily lives of individuals -- it must be all-inclusive; its **content, activities,** and **skills development** opportunities must permeate each grade and each grade cluster across the PreK-Grade 12 curriculum.

Curricular designs must provide students with opportunities for interdisciplinary **concepts, knowledge,** and **skills** acquisition and repeated application in the classroom, school-wide, and in the lifespace community. Such a design requires that each teacher in the several grades be made aware of what is being taught/reinforced in every other grade -- system-wide.

A concerted effort must be made by curriculum coordinators, grade cluster leaders, and system-wide/building level administrators to bring PreK-Grade 12 teachers together, on a regular basis, for 1) general discusions, 2) the exchange of instructional ideas and strategies (as they relate to **ECO/SOCIAL Studies** and national standards), 3) opportunities for inservice training, and 4) unit/ lesson writing.

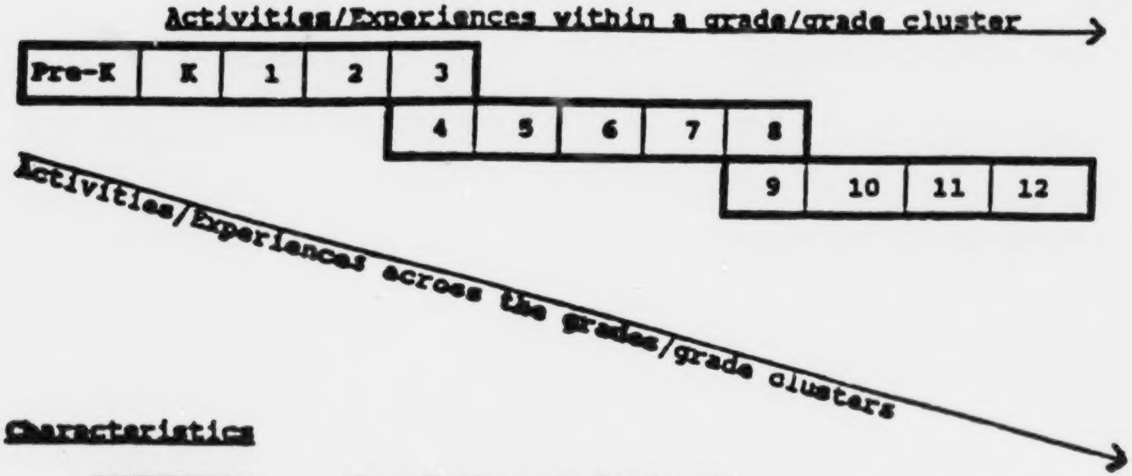
Community resources (people, places, things, events, processes) must be a component of the unit/lesson writing process -- as well as an integral part of the inservice training program. Before they can assist students in better understanding Earth's biosphere, in helping them develop a sensitivity toward NATURE, and intelligently discussing 21st century issues and problems confronting MAN

& NATURE, classroom teachers must be formally introduced to 1) concepts, knowledge, and skills that are related to specific subjects (e.g., the sciences, economics, geography, history), 2) ways in which subject-specific concepts, knowledge, and skills in a given academic area (e.g., the sciences) are related to subject-specific concepts, knowledge, and skills in other academic areas of the curriculum, 3) the diversity of community resources that exist in the local/area environments, 4) the diversity of instructional materials that exist -- as related to **ECO/SOCIAL Studies**, 5) the nature and characteristics of natural and ***built*** environments that exist within the confines of the region, 6) techniques that can be used by teachers to design **learning encounter menus** and plan for classroom and field-based activities, 7) techniques that students can use to collect field-based data, 8) the operation and use of graphic media devices (cameras and videotape equipment), 9) techniques for writing interdisciplinary, thematic units and daily lesson plans (see the *National Standards Unit Outline*), and 10) Internet web sites -- and ways that they can be integrated into unit outlines and daily lesson plans.

Whatever is learned, by students, must be repeatedly applied to new-and-diverse situations throughout the grades -- as new concepts and knowledge are constantly being added to the students' warehouse of stored experiences and resultant insights. A plethora of classroom, school-wide, and field-based experiences provide the foundation for an individual's *frame of reference* (insights, understandings, and sensitivity) ; the springboard for future learning -- as students apply concepts, knowledge, and skills acquired through a series of real life and real-to-life experiences to new situations. STUDENTS WHO HAVE A REPERTOIRE OF

EXPERIENCES (an enriched *frame of reference*) ARE EDUCATIONALLY ADVANTAGED; possessing the intellectual and experiential foundation for enriched learning, while STUDENTS WHO HAVE BEEN DENIED VARIED EXPERIENCES (throughout the grades -- for a variety of reasons) ARE EDUCATIONALLY DISADVANTAGED; devoid of the intellectual and experiential foundation for enriched learning. Students who possess a full repertoire of experiences continuously add to their warehouse of knowledge (as they progress through the grades) while students who are do not possess a full repertoire of experiences fall academically farther and farther behind -- grade after grade. Thus, over time, the gulf between EDUCATIONALLY ADVANTAGED STUDENTS and EDUCATIONAL DISADVANTAGED STUDENTS widens -- resulting in some moving on (academically) while others are left behind.

A CURRICULUM SCHEME TO ENHANCE PROGRAM DELIVERY, TEACHING, AND LEARNING


Activities/Experiences within a grade/grade cluster
Pre-K
K
1
2
3
4
5
6
7
8
9
10
11
12
Activities/Experiences across the grades/grade clusters

Characteristics

CONTINUOUS (Pre-K through Grade 12)

INTEGRATED (concepts, knowledge, and skills that are both discipline-specific and universal across the curriculum are blended into a holistic approach to teaching and learning)

SEQUENTIAL (developmental; age/ability/grade appropriate)

Concepts/knowledge/skills *acquired* in a given grade/grade cluster are *applied*, *reinforced*, and *refined* across the several grades/grade clusters.

Attention must be paid to students'

- preferred learning styles;
- multiple intelligences (Howard Gardner);
- prior learning and experiences;
- native abilities;
- attention spans; and
- intellectual, social, emotional/psychological, and physical development.

UNIT OUTLINE

The *National Standards Unit Outline* is an organizational schema -- with an emphasis on **goals** and **objectives** that are related to standards statements in any of the following areas (depending upon the theme/topic of a particular unit):

Civics & Government

Economics

Environmental Education

Geography

History

NCSS Thematic Framework

Science

The ARTS

Using the *Standards* outline, teachers are able to organize pre-planning thoughts and proposed teaching-learning activities -- using a one-page format that is easy to read. The resulting document displays the relationships between **abstract thought** and the **practical application** of concepts, knowledge, and skills (gleaned from the several *Standards* areas) -- in the classroom, school-wide, and in the lifespace community.

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THEME/TOPIC	UNIT GOALS	LESSON OBJECTIVES	LESSON ACTIVITIES	MATERIALS AND RESOURCES	ASSESSMENT
		M	M	M	M
		T	T	T	T
		W	W	W	W
		TH	TH	TH	TH
		F	F	F	F
The focus for instruction and learning	What students will be able to do, to understand, and to explain in the long term	Short-term performance and process-based outcomes of instruction and learning	Learning encounters that students will participate in -- both in the classroom and at field-based sites in the community	Items/objects used to enhance instruction and/or learning	Ways of determining students' progress toward goals/objectives attainment and their levels of achievement
	NATIONAL STANDARDS				

UNIT OUTLINE

ECO-teach LESSON DESIGN FORMAT

THEME/TOPIC (Teaching & Learning Focus)

GRADE(S) (Grades & Grade Clusters)

SUBJECT(S) (Concepts, Knowledge & Skills Gleaned From Various Subjects)

DURATION (Interval Of Time Reserved For Classroom & Field-Based Studies)

****

DATA (Background Information Related To The Theme/Topic)

UNIT GOAL(S) (Related To National Standards In Various Subjects)

LESSON GOAL(S) (Related To Unit Goal(s)

LESSON OBJECTIVE(S) (Related To Lesson Goal(s)

Introduction (Learning Encounters Menu)

Teaching/Learning (Guided Practice)

Closure (Bring Day's Activities To An End & Introduce Future Activities)

MATERIALS/RESOURCES (Print/Non-Print, CD-ROM Software, Internet, Graphic Media)

INTERNET (Web Sites For Students' Use RE: Research & Data Collection)

ASSESSMENT (Strategies To Determine Students' Progress & Longitudinal Development)

HOMEWORK (Independent Practice)

WEB SITE RESOURCES FOR TEACHERS

****

SUGGESTED PROJECTS (Learning Enhancement Activities)

***ECO-teach* Lesson Plans**

Flora & Fauna (PreK-Grade 6)

Sensing the Lifespace Environment (PreK-Grade 12)

Introduction to Ecology (Grades 3-6)

Defining the Environment (Grades 4-6)

Natural Resources (Grades 4-8)

NATURE in Art, Music & Literature (Grades 4-8)

Earth's *Carrying Capacity* (Grades 5-12)

Habitat & Species (Grades 5-12)

BIOME: *DESERTS* (Grades 7-12)

BIOME: *MOUNTAINS* (Grades 7-12)

BIOME: *RAINFORESTS* (Grades 7-12)

BIOME: *WETLANDS* (Grades 7-12)

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Environmental Engineering (Grades 7-12)

Pollution (Grades 7-12)

LAND USE: *Policies & Practices* (Grades 9-12)

Sustainable Development (Grades 9-12)

Conservation & Stewardship (Grades 10-12)

Understanding the Hydrosphere (Grades 10-12)

ECO-teach Lesson Plan

THEME/TOPIC	Flora & Fauna
GRADE(S)	PreK/K - Grade 6
SUBJECT(S)	Biology, Botany, Geography, Language Arts
DURATION	Three-to-five 30-50 minute classes and nature walks OR amounts of time appropriate for students' age/grade level(s)
DATA	An ***ecosystem*** is characterized by the ***relationships*** that exist among and between ***living organisms*** and their ***environment(s)***. The ***biological environment*** consists of all living organisms and ***species*** found within a given ***geographical region***. ***Habitat*** is where ***flora*** and ***fauna*** live. What an animal does depends greatly on where it lives. Forests moderate temperatures and augment rainfall. Through the ***process*** of ***photosynthesis*** plants and trees provide human beings and other living creatures oxygen-rich air to breathe. ***Vegetation*** helps regulate the flow of water and maintains levels of water in natural ***reservoirs***. Plant life ***roots*** bind ***soil*** and ***foliage*** acts as a ***wind barrier***. ***Populations*** of birds and other ***predators*** control ***insect*** and ***rodent*** populations. ***Habitat loss*** results in the ***depletion*** of flora and fauna in given areas/regions. The list of ***endangered species*** continues to grow as a result of ***environmental degradation.***
UNIT GOAL(S)	As a result of research-oriented investigations, students will understand and appreciate: . the existence of different types of flora . the existence of different types of fauna . the existence of different types of natural environments . the existence of specialized habitats within which different types of flora can be found . the existence of specialized habitats within which different types of fauna can be found.

LESSON GOAL(S) As a result of classroom and field-based activities, students will understand and appreciate:

- the characteristics of selected flora
- the characteristics of selected fauna
- relationships between selected flora & fauna
- characteristics of selected natural sites where flora & fauna exist.

LESSON OBJECTIVE(S) Students will:

- define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)
- use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class
- interact with community resources (people, places, things, events, processes) and collect data for presentations to the class
- conduct field-based research and collect data for presentations to the class
- work cooperatively in small research groups
- create a variety of presentations to the class (oral reports, written reports, audiovisual essays, power point presentations)
- create visual displays (bulletin boards, murals, timelines, overhead projector transparencies, matrices, tabletop diaramas).

LESSON ACTIVITIES

Introduction (Each teacher selects from the following options)

- Students view an audiovisual presentation that depicts a natural site in an urban, rural, suburban, or wilderness location -- with emphasis on the types of flora and fauna to be found therein. NOTE: Each teacher identifies a ***biome*** to study (desert, forest, grassland, wetland etc)
- Guest speakers discuss types of flora and/or fauna native to the local community (plants and/or animals are brought to the classroom for students to observe)
- Students go on a nature walk to observe types of flora and fauna (animals, birds, reptiles)
- Students visit a field-based natural site and observe flora and fauna
- Students visit a field-based natural site and conduct research studies -- taking notes regarding phenomena and processes observed, collecting sights and sounds using 8mm/16mm motion picture cameras/still photography cameras, videotape equipment/audiotape recorders, making drawings of phenomena observed, etc
- The teacher reads a story about animals that live in selected natural sites
- Students visit a wildlife preserve, zoo, or aviary and observe animals, brids, and reptiles in simulated natural environments.

Teaching/Learning (Guided Practice)

- A discussion of the audiovisual presentation. Students are given copies of a ***biome data sheet*** to put into their notebooks.
- Working in small research groups, students use dictionaries to define key vocabulary words/terms
- Working in small research groups, students use atlases-wall maps-globes to locate selected natural sites. Data is recorded on desktop outline maps
- Working in small research groups, students use encyclopedias and/or Internet web sites to collect data
- Students ask questions of guest speakers
- Students observe their surroundings when on nature walks

- Students observe their surroundings when on field-based excursions
- Students conduct research and collect data at selected natural sites
- The teacher uses maps, globes, CD-ROM software (etc) to teach a geography lesson regarding selected natural sites -- students record data on desktop outline maps
- Students write activity-related reports, make formal presentations to the class, create visual displays related to classroom and/or field-based activities, search the Internet for supplemental data (etc)
- Students create tabletop diaramas that depict natural sites -- local and far-removed
- Working in small research groups, students conduct botany studies in the classroom and at field-based sites

Closure

- Students exhibit/discuss art work
- Class discussions regarding field-based activities
- The teacher reviews data collected in the classroom and/or at field-based sites
- Students display map work and discuss their findings
- Students read aloud the vocabulary-related sentences and/or paragraphs that they wrote
- Students discuss their visual displays/projects
- Students select books to read that are related to the flora. fauna, natural sites (environments) discussed/studied in class and at field-based sites

MATERIALS/RESOURCES

Episodes of Jack Hanna's ANIMAL ADVENTURES (television syndication)

Any nature presentation or biome study recorded (by the teacher or students) from television

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Maps, globes, charts, atlases

Desktop outline maps

Dictionaries and encyclopedias

Overhead projector transparencies

Nature studies-related books and magazines

Daily newspapers and periodicals

Overhead projector transparency sheets and markers

Notebooks

Computers

8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment, audiotape recorders

INTERNET

www.csf.colorado.edu/consbio (Conservation Biology)

www.biodiv.org (Biological Diversity)

www.mobot.org (Missouri Botanical Garden)

www.wildflower.org (The Lady Bird Johnson Wildflower Center)

www.audubon.org (Audubon Society)

www.panda.org (WWF Global Network)

www.americanforests.org (American Forests)

www.epa.gov (Environmental Protection Agency)

www.fs.fed.us (USDA Forest Service)

www.americanbirding.org (American Birding)

www.discovery.com (The DISCOVERY Channel)

www.npca.org (National Parks Conservation Association

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about flora and fauna

talking about flora and fauna

writing about flora and fauna

reading about natural environments (ecosystems)

talking about natural environments (ecosystems)

writing about natural environments (ecosystems)

making oral reports and audiovisual presentations

creating visual displays (including art work)

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

composing questions to be asked in class and at field-based sites

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts & crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

www.wilderness.org (The Wilderness Society)

www.doi.gov (U.S. Department of the Interior)

www.earthsystems.org (EarthSystems)

www.conservation.org (Conservation International)

www.defenders.org (Defenders of Wildlife)

www.envirolink.org (EnviroLink)

www.bdt.org.br/bin21/bin21.html (Biodiversity Information Network)

www.webcom.com/` iwcwww (International Wildlife Coalition)

www.edf.org (Environmental Defense Fund)

www.nationalgeographic.com (National Geographic Society)

www.ericse.org (ERIC Clearinghouse for Science, Mathematics and Environmental Education)

www.environmentaldirectory.net (Environmental Directory Network)

www.usgs.gov (U.S. Geological Survey)

Lesson Plan: FLORA & FAUNA

STUDENTS PLANT FLOWER SEEDS

Plant selected varieties of flower seeds in window boxes.

Regularly water and care for the seeds and young plants -- record data in research logs.

BEFORE-DURING-AFTER seed germination and flowering process photographs -- presented as a visual display.

Observe seed germination and flowering processes -- record data in research logs.

MATERIALS

Seeds, potting soil, plant food, watering can(s), fertilizer, sunlight, water, window boxes, gardening hand tools (etc).

Hull, H. Wild Flowers in Your Garden. New York, NY: Barrows

Taylor, N. Wild Flower Gardening. Princeton, NJ: D. Van Nostrand Company, Inc.

STUDENTS MAKE A TERRARIUM

Take a field trip -- to observe biome exhibits in a museum of natural history, to observe biome exhibits at an aviary OR to observe the environmental surroundings at a selected nature site.

Select a biome (e.g., desert, grassland, woodland, wetland, rainforest, alpine mountain) and make a terrarium version of that ecosystem.

BEFORE-DURING-AFTER terrarium development/plant growth photographs -- presented as a visual display.

Observe seed germination and flowering -- record data in research logs.

MATERIALS

Seeds, plants, fish tank -or- large glass fish bowl, sand-dirt-potting soil, plant food, watering can(s), sunlight, water (etc). Turtles, tree toads, worms, snakes, mice, snails (etc) are optional.

Birdseye, C. Growing Woodland Plants. New York, NY:
Oxford University Press

STUDENTS MAKE AN ANT FARM

Construct an ant farm.

BEFORE-DURING-AFTER ant colony establishment photographs -- presented as a visual display.

Observe ants' behavior and daily routines -- record data in research logs.

MATERIALS

Metal or wood frame, 2 panes of glass, dirt or soil, ants, food (etc).

STUDENTS PLANT AN OUTDOOR VEGETABLE GARDEN

Take a field trip -- to a neighborhood backyard garden, to a farm OR to a commercial truck gardening site and observe/learn about different types of vegetable crops, growing time, growing seasons, planting and harvesting processes (etc).

Select a plot of land and prepare the soil for planting.

Sow seeds in rows or hills OR plant a variety of plants in rows or hills (and stake -- if necessary).

BEFORE-DURING-AFTER garden preperation/planting/growing season photographs -- presented as a visual display.

Observe seed germination and plant flowering processes -- record data in research logs.

Observe the growing process -- record data in research logs.

Maintain/care-for the garden during the growing season -- record data in research logs.

Harvest the crops at the end of the growing season -- record data in research logs.

MATERIALS

Plot of land, gardening tools, gloves, seeds & plants, peat moss, fertilizer, plastic ground cover, garden hose(s), watering can(s), wooden stakes and/or wire frames -- to support plant growth, netting, environmentally-safe pesticides and spraying equipment (etc).

STUDENTS PLANT AN OUTDOOR FLOWER GARDEN OR ROCK GARDEN

Take a field trip -- to a neighborhood backyard flower or rock garden, to a greenhouse OR to a commercial nursery. Be introduced to a variety of plants & shrubs. Learn about plant & shrub growth processes/seasons. Learn about plant & shrub care. Observe stages of plant & shrub growth as well as the flowering process.

Select a plot of land. Prepare the soil for planting and landscaping.

BEFORE-DURING-AFTER photographs of ground preperation, landscaping, sewing seeds, planting shrubs and bushes, planting varieties of flowering plants and decorative grasses (etc) -- presented as a visual display.

Observe seed germination and plant flowering processes -- record data in research logs.

Maintain/care-for the garden during the growing season -- record data in research logs.

MATERIALS

Plot of land, seeds & plants, shrubs & bushes, decorative grasses, gardening tools, gloves, rocks & landscaping ties, water hose(s), watering can(s), peat moss, fertilizer, plastic ground cover, mulch, wood chips, netting , environmentally-safe pesticides and spraying equipment (etc).

Durand, H. My Wildflower Garden. New York, NY:
G. P. Putnam's Sons

McKenny, M. The Wild Garden. New York, NY: Doubleday

ECO-teach Lesson Plan

THEME/TOPIC	Sensing the Lifespace Environment
GRADE(S)	PreK/K - Grade 12
SUBJECT(S)	Biology, Botany, Earth Science, Fine Arts, Geography, Geology, History, Language Arts
DURATION	Five 50-90 minute classes OR amounts of time appropriate for students' age/grade level(s)
DATA	Each human being, regardless of age and geographical location, ***interacts*** with the ***lifespace environment*** through the several ***senses***. The word ***environment*** means to surround, encompass or encircle. Thus, lifespace environment refers to all the ***natural*** and ***built phenomena*** that surrounds each of us. Man's ***physical environment*** includes air, water, ***inorganic chemicals***, and physical ***structures***; the ***biological environment*** includes all ***living organisms*** of other ***species -- microorganisms***, ***plants***, ***animals***, and the entire living ***community*** of other species that ***exist*** around Man (in any specified geographical location); the ***social environment*** includes all human beings who share the same culture, history, traditions, beliefs in a given geographical location. Man's ***survival*** will ultimately depend upon an understanding of the nature and characteristics of the several layers of lifespace environment -- from the local layer through to the global layer. Human beings must understand that MAN & NATURE are inextricably linked. Man needs to develop ***environmental*** literacy -- the ***intellectual*** tools (critical thinking, decision-making, problem solving) and practical skills needed to become ***caring stewards*** of the ***planet***.
UNIT GOAL(S)	As a result of research-oriented investigations, students will understand and appreciate:

the natural characteristics of diverse lifespace environments

the human-made (***built***) characteristics of diverse lifespace environments

ways by which human beings interact with other species to be found in diverse lifespace environments.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the different types of flora that exist in the local/area lifespace environment

the different types of fauna that exist in the local/area lifespace environment

ways by which human beings interact with the flora and fauna to be found in the local/area lifespace environment.

LESSON OBJECTIVE(S)

Students will:

define selected vocabulary and incorproate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class conduct field-based research and collect data for presentations to the class -- using ***graphic media devices*** to record data on film/video tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audiovisual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas).

LESSON ACTIVITIES (Each teacher selects from the following options)

Introduction

Students view an audiovisual presentation that depicts the characteristics of a natural environment

Students view an audiovisual presentation that depicts the characteristics of a human-made (***built***) environment

Guest speakers discuss the characteristics of diverse natural environments (e.g., deserts, forests, grasslands, mountains, polar regions, wetlands)

Guest speakers discuss the characteristics of diverse human-made (***built***) environments (e.g., urban, rural, suburban, town, village, city)

Students go on a nature walk and observe the physical characteristics of the selected natural environment

Students go on a field trip to a selected ***built*** environment and observe the physical characteristics and related activities

Students conduct research studies at selected natural environment sites

Students conduct research studies in selected ***built*** environments

The teacher reads stories about natural environments (species, processes, seasons, etc)

The teacher reads stories about ***built*** environments (human activities, processes, ways-of-living, social events, etc).

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation -- with related notetaking

Students read about natrual and ***built*** environments in newspapers and magazines and collect data

Working in small research groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected natural and/or ***built*** environments that are nearby/close to home or distant/far-removed. Data is recorded on desktop outline maps

Working in small research groups, students use encyclopedias and/or Internet web sites to collect data

Students look/listen for phenomena/sounds while on a nature walk

Students look/listen for phenomena/sounds while at natural sites. Data is recorded on film/video tape and later used in audiovisual presentations to the class

The teacher uses atlases, maps, globes, CD-ROM software (etc) to teach a geography lesson about selected natural and/or ***built*** environments.

Closure

Students create visual displays related to things seen/heard while on nature walks and/or conducting research studies at natural environment sites

Students create visual displays related to things seen/heard while touring and/or conducting research studies in ***built*** environments

Discussions of what was seen/heard while studying natural and/or ***built*** environments

Students write essays about their impressions of natural and/or ***built*** environments visited/studied -- using defined vocabulary words/terms

Students draw pictures of objects/things observed while on a nature walk through a selected environment

Students draw pictures of objects/things/activities observed while conducting research in a selected ***built*** environment

Students draw pictures of objects/things/processes observed while conducting research at a selected natural environment site

Students write poems about sights/sounds found in natural environments

Students write poems about sights/sounds found in ***built*** environments.

MATERIALS/RESOURCES

Episodes of **NATURE** on PBS

Episodes of **National Geographic EXPLORER** on TBS

The DISCOVERY Channel

Jack Hanna's ANIMAL ADVENTURES (syndicated)

National Geographic:

(special issue) Making Sense of the Millennium
v193n1, January 1998

"Physical World," v193n5, May 1998, p 2-37

"America's Wilderness," v194n5, October 1998
p 2-23

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), video tape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.nwf.org (National Wildlife Federation)

www.audubon.org (Audubon Society)

www.americanbirding.org (American Birding)

www.americanforests.org (American Forests)

www.outdoors.org (Appalachian Mountain Club)

www.wilderness.org (The Wilderness Society)

www.amrivers.org (American Rivers)

www.biodiv.org (Biological Diversity)

www.wildflower.org (The Lady Bird Johnson Wildflower Center)

www.janegoodall.org (The Jane Goodall Institute)

www.eb.com (Explore Britannica)

www.nationalgeographic.com/maps (National Geographic Society)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about the nature and characteristics of diverse natural environments

talking about the nature and characteristics of diverse natural environments

writing about the nature and characteristics of diverse natural environments

reading about the nature and characteristics of diverse ***built*** environments

talking about the nature and characteristics of diverse ***built*** environments

writing about the nature and characteristics of diverse ***built*** environments

making oral reports and audiovisual presentations creating visual displays (including art work)

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

composing questions to be asked in class and at field-based sites

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts & crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

www.askeric.org	(Ask ERIC)
www.secondnature.org	(Second Nature)
www.iwla.org	(Izaak Walton League)
www.earthsystems.org	(Earth Systems)
www.envirolink.org	(Environmental Links)
www.gap.uidaho.edu	(GAP: A Geographic Approach to Planning for Biological Diversity)
www.sdsc.edu/ESA/esa.htm	(The Ecology Society of America)
www.ericse.org	(ERIC Clearinghouse for Science, Mathematics and Environmental Education)
www.geologylink.com	(Geology Link)

Lesson Plan: LIFESPACE ENVIRONMENTS

STUDENTS COLLECT NATURAL ENVIRONMENT ARTIFACTS

Take a field trip -- to collect moss, fungi, tree bark, leaves, rocks, soil samples (etc) at a selected nature site. Data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while at the field trip site.

Create a ***Nature's Artifacts*** *inquiry box* -- containing items collected at the nature site.

Write data cards to accompany the *inquiry box* items.

Data collected on film/videotape and audio tapes are included in the *inquiry box* collection.

Donate the *inquiry box* to special education classes -- to enhance their study of the lifespace environment.

MATERIALS

Spoons-trowels-spades, plastic zip-lock bags, rockhound hammers, safety glasses, graphic media devices, magnifying glasses, compasses, covered cardboard storage boxes, oak tag, index cards, Internet web sites, encyclopedias, CD-ROM software (etc)

May, R. "How Many Species on Earth?" ***Scientific American*** October 1992

STUDENTS COLLECT BUILT ENVIRONMENT ARTIFACTS

Take a field trip -- to collect human-made objects found in a variety of ***built*** environments; towns, villages, suburbia, inner cities. Data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while at the field trip site.

Create a ***Man-made Artifacts*** *inquiry box* -- containing objects collected at the ***built*** environment site.

Write data cards to accompany the *inquiry box* objects.

Data collected on film/videotape and audio tapes are included in the *inquiry box* collection.

Donate the *inquiry box* to special education classes -- to enhance their study of the lifespace environment.

MATERIALS

Graphic media devices, research logs, covered cardboard storage boxes, human-made objects, oak tag, index cards, Internet web sites, encyclopedias, CD-ROM software (etc).

ECO-teach Lesson Plan

THEME/TOPIC	Introduction to Ecology
GRADE(S)	Grades 3 - 6
SUBJECT(S)	Biology, Botany, Earth Science, Geography, Geology
DURATION	Three to five 20 - 50 minute classes

DATA

Ecology is the study of ***habitats***. ***Ecological systems*** consist of complex webs of interaction among ***diverse organisms***; **everything is connected to everything else**. Ecological studies investigate the ***interactions*** and ***relationships*** among/between living systems and their ***environment*** (***communities***). ***Niche*** is the way a ***species population*** fits into a given community. The habitat of a species is the range of environments in which it lives. ***Natural selection*** is the ***process*** through which living things (***plants, animals, fungi, bacteria, viruses***) become ***adapted*** to their environment. The ***physical environment*** of an organism includes the air, water, ***inorganic chemicals***, and ***physical structure*** around that organism. The Earth is ***finite***; its physical environment and its ***biological environment*** are either ***renewable*** or ***nonrenewable resources***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the diverse nature and characteristics of Earth's (global) environment(s)

ways that flora and fauna have adapted, over time, to their lifespace environment(s) specialized habitats in which particular types of flora and fauna exist

ways that human beings have adapted, over time, to their lifespace environment(s).

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the diverse nature and characteristics of the local/area environment(s)

ways that flora and fauna have adapted, over time, to the local/area lifespace environment(s)

ways that human beings have adapted, over time, to the local/area lifespace environment(s)

ways that human beings have altered the local/area lifespace environment(s) in order to accommodate their lifestyles and economic/cultural-social development.

LESSON OBJECTIVE(S)

Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using ***graphic media devices*** to record data on film/videotape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audiovisual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas).

LESSON ACTIVITIES (Each teacher selects from the following options)

Introduction

Students view an audiovisual presentation that depicts the characteristics of the global and/or local/area environment(s)

Students view an audiovisual presentation that depicts ways flora and fauna have adapted to the global and/or local/area environment(s)

Students view an audiovisual presentation that depicts ways human beings have adapted to the global and/or local/area environment(s)

Students view an audiovisual presentation that depicts ways human beings have altered the global and/or local/area environment(s)

Guest speakers discuss the characteristics of environments; flora/fauna adaptations; human adaptations; and/or human alterations of the environment(s)

Students go on a nature walk and observe the characteristics of the environment; the physical structure of flora and fauna; and/or human alterations of the environmental area/site

Students go on a field trip to a selected natural and/or ***built*** environment(s) and observe the physical structure; activities and/or processes; and ways that the site(s) interact with the total lifespace environment

Students conduct research studies at selected natural environment sites

Students conduct research studies at selected ***built*** environment sites

The teacher reads stories about flora and fauna, diverse environments, man's technological development, evidence of man's success (throughout history) to alter the natural lifespace environment(s)

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

Students read about natural and ***built*** environments in books, magazines, and newspapers and collect data

Students read about types of flora and fauna found in selected areas/regions of the global environment in books, magazines, and newspapers and collect data

Students read about ways that human beings have altered the global environment in books, magazines, and newspapers and collect data

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected natural and/or ***built*** environments that are nearby/close to home or distant/far-removed. Data is recorded on desktop outline maps

Students collect data on film/videotape while on a nature walk -or- field trip -or- conducting research at a field-based site

The teacher uses atlases, maps, globes, CD-ROM software (etc) to teach a geography lesson about selected natural and/or ***built*** environment(s)

Closure

Students create visual displays related to things seen/heard while on a nature walk -or- on a field trip -or- conducting research at a field-based site

Discussions of what was seen/heard while studying natural and/or ***built*** environment(s)

Students write essays about their impressions of natural and/or ***built*** environments visited/studied -- using defined vocabulary words/terms

Students draw pictures of objects/things observed while on a nature walk -or- field trip -or- conducting research at a field-based site

Students write poems about sights/sounds found in natural and/or ***built*** environment(s).

MATERIALS/RESOURCES

Episodes of **NATURE** on PBS

Episodes of **National Geographic EXPLORER** on TBS

Episodes of **Earth Matters** on CNN

The DISCOVERY Channel

Jack Hanna's ANIMAL ADVENTURES (syndicated)

National Geographic:

(special issue) Making Sense of the Millennium
v193n1, January 1998

"Physical World," v193n5, May 1998, p 2-37

"America's Wilderness," v194n5, October 1998
p 2-23

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.nwf.org (National Wildlife Federation)

www.sierraclub.org (Sierra Club)

www.tnc.org (The Nature Conservancy)

www.epa.gov (Environmental Protection Agency)

www.biggreen.org (Big Green)

www.globalstewards.org (Global Stewards)

www.scenic.org (Scenic America)

www.americanforests.org (American Forests)

www.outdoors.org (Appalachian Mountain Club)

www.sdsc.edu/ESA/esa.htm (The Ecology Society of America)

www.ser.org (Society for Ecological Restoration)

www.fs.fed.us (USDA Forest Service)

ASSESSMENT

Students demonstrate acquired knowledge and skills development by:

reading about the nature and characteristics of diverse natural environments

talking about the nature and characteristics of diverse natural environments

writing about the nature and characteristics of diverse natural environments

reading about diverse types of flora and fauna

talking about diverse types of flora and fauna

writing about diverse types of flora and fauna

reading about living organism/human adaptation to surrounding lifespace environments talking about living organism/human adaptation to surrounding lifespace environments

writing about living organism/human adaptation to surrounding lifespace environments

reading about human efforts to alter the natural environment(s)

talking about human efforts to alter the natural environment(s)

writing about human efforts to alter the natural environment(s)

making oral reports and audiovisual presentations

creating visual displays (including art work)

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts & crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

www.usgs.gov (U.S. Geological Survey)

www.ericse.org (ERIC Clearinghouse for Science, Mathematics and Environmental Education)

www.naaee.org (North American Association for Environmental Education)

www.wildflower.org (The Lady Bird Johnson Wildflower Center)

www.mobat.org (Missouri Botanical Garden)

www.biodiv.org (Biological Diversity)

www.iwla.org (Izaak Walton League)

www.art.man.ac.uk (Centre for Urban and Regional Ecology) www.foe.org (Friends of the Earth)

www.earthsystems.org (Earth Systems)

www.cnie.org/nie (National Library for the Environment)

www.durangonaturestudies.org (Durango Nature Studies)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: INTRODUCTION TO ECOLOGY

STUDENTS CONDUCT COMPARATIVE STUDY

Take a field trip(s) -- to a variety of local/area ecosystems-biomes to observe similarities and differences among properties of the site environments. Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Meeting(s) with community resource people -- to understand the origins and characteristics of each ecosystem-biome, to understand the interrelationships that exist among each ecosystem's-biome's flora & fauna (etc), to understand ways by which Nature's ecosystems-biomes contribute to the quality of Man's lifespace(s).

Use maps to geographically locate the sites visited. Record data on desktop outline maps.

Research -- *ecosystem(s), biome(s), habitat(s), niche(s), balance of nature* (etc).

Periodically -- revisit the sites to observe any/all changes that may have occurred. Record data in research logs and on film/videotape and audiotape.

Create visual displays and audiovisual presentations.

MATERIALS

Community resource sites, community resource people, graphic media devices, research logs, atlases & maps, desktop outline maps, Internet web sites, CD-ROM software, dictionaries, encyclopedias (etc).

Brewer, R. The Science of Ecology. Philadelphia, PA:
Saunders College Publications

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Take field trips -- to selected local/area nature sites to observe examples of *COOPERATIVE LIVING HABITATS (* in which MAN-NATURE coexist and mutually prosper from their associations) and *ENVIRONMENTAL RIFT (* contexts within which MAN-NATURE do not coexist and mutually prosper but rather compete for survival -- oftentimes to the detriment of both entities). Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trips.

Research -- *MAN-NATURE relationships, environmental degradation, habitat(s), niche(s), ecosystem(s), flora, fauna, biome(s)* (etc).

Use maps to geographically locate nature sites visited. Record data on desktop outline maps.

Periodically -- revisit the sites and record observations in research logs and on film/videotape and audiotape.

Create visual displays and audiovisual presentations.

MATERIALS

Community resource sites, community resource people, atlases & maps, graphic media devices, research logs, dictionaries, encyclopedias, Internet web sites, CD-ROM software (etc).

Miller, J. A. "Invasion of the Ecosystem," ***Science News***
June 1985

ECO-teach Lesson Plan

THEME/TOPIC	Defining the Environment
GRADE(S)	Grades 4 - 6
SUBJECT(S)	Biology, Botany, Geography, History, Language Arts
DURATION	Three to five 30 - 50 minute classes and related field-based activities

DATA

An understanding of lifespace environment ***phenomena*** and ***processes*** requires that the individual be familiar with an array of environment-related words and terms, and that he/she be able to incorporate this vocabulary into oral conversations and written expressions.

In certain ways MAN (as a ***species***) has ***adapted*** to his ***natural surroundings*** but he has also ***transformed*** the ***natural habitat*** by creating ***built environments***; sheltered enclaves within the larger lifespace environment in which he controls local conditions. Thus, there is a struggle between Man and the ***biological environment*** for a share of the ***physical environment***. Man's ***alteration*** of the lifespace environment has affected the ***balance of nature***.

Biodiversity -- the ***ecosystems***, species, and ***genes*** that together make life on Earth possible -- is collapsing at an astounding rate. Human ***society*** is growing in numbers and in ***consumption*** of both ***renewable*** and ***nonrenewable*** (***finite***) ***natural resources.*** Man must soon realize the need to find a ***balance*** between ***ecology*** and ***development***. ***Erosion*** and the ***conversion*** of prime agricultural ***farmland*** to nonagricultural uses are cited as contributing to the long-term ***deterioration*** of Earth's natural resource base. Man added a whole new dimension to ***environmental***

pollution when he started burning ***fossil fuels*** for ***energy***. Man has continued to ***dispose*** of ***wastes*** by dumping them into Earth's ***atmosphere*** and ***hydrosphere***. The ***carrying capacity*** of the planet is being seriously threatened by Man's ***disregard for nature*** and its ***organic*** and ***inorganic*** resources. Habitat loss results in the ***depletion*** of ***flora*** and ***fauna*** in given geographical areas/regions. The list of ***endangered species*** continues to grow as a result of ***environmental degradation***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the diverse nature and characteristics of Earth's (global) biological community

the concept: ***balance of nature***

the diverse nature and characteristics of Earth's (global) renewable and nonrenewable natural resources

the concept: ***carrying capacity***.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the diverse nature and characteristics of the local/area biological community

the concept: ***balance of nature***
as applied to the local/area environment(s)

the diverse nature and characteristics of local/area renewable and nonrenewable natural resources

the concept: ***carrying capacity***
as applied to the local/area environment(s).

LESSON OBJECTIVE(S) Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audiovisual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas).

LESSON ACTIVITIES (Each teacher selects from the following options)

Introduction

Students view an audiovisual presentation that depicts the characteristics of the global and/or local/area biological community

Students view an audiovisual presentation that explains the ***balance of nature*** and/or details ways in which the balance of nature has been/is currently upset by natural and/or human-made forces

Students view an audiovisual presentation that discusses ***renewable*** and ***nonrenewable*** (***finite***) natural resources found on a global scale and/or in the local/area environment(s)

Students view an audiovisual presentation that discusses the plight of Earth's ***carrying capacity*** nearby/close to home and/or distant/far-removed

Guest speakers discuss any-or-all of the following topics: balance of nature, renewable & nonrenewable resources, biological communities, Earth's carrying capacity

Students go on a nature walk and observe/learn about any-or-all of the following topics: balance of nature, renewable & nonrenewable resources, the biology of the local/area environment(s), the plight of local/area environments' carrying capacity

Students go on field trips to selected natural environment sites and observe: evidence of the balance of nature, renewable & nonrenewable resources, the biology of the site, the plight of the local/area environments' carrying capacity

Students conduct research studies at selected natural sites

The teacher reads stories about: the balance of nature, renewable & nonrenewable natural resources, biological communities, Earth's carrying capacity

Students bring newspaper articles to class and discuss the balance of nature, renewable & nonrenewable resources, biological communities, Earth's carrying capacity

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

Students read about the balance of nature, renewable and nonrenewable natural resources, biological communities, Earth's carrying capacity

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate natural resource sites

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate biological community sites

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate sites where there is evidence of negative effects upon the balance of nature OR negative effects (***stress***) upon Earth's carrying capacity

Students collect data on film/videotape while on a nature walk -or- field trip -or- conducting research at a field-based site

The teacher uses atlases, maps, globes, CD-ROM software (etc) to teach a geography lesson about: the balance of nature, renewable & nonrenewable resources, biological communities, Earth's carrying capacity

Closure

Students create visual displays related to things seen/heard while on a nature walk -or- on a field trip -or- conducting research at a field-based site

Discussions of what was observed/learned while studying: the balance of nature, renewable & nonrenewable natural resources, biological communities, Earth's carrying capacity

Students write essays about their impressions of the balance of nature, renewable & nonrenewable natural resources, biological communities, Earth's carrying capacity

Students draw pictures of things observed while on a nature walk -or- on a field trip -or- conducting research at a field-based site

Students write poems about sites visited and things observed.

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS

Episodes of **Nature** on PBS

Episodes of **Hidden Gardens** and other botanical-related programs on HGTV (Home&Garden Television)

Jack Hanna's ANIMAL ADVENTURES (syndication)

National Geographic:

"Physical World," v193n5, May 1998, p 2-37

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.discovery.com	(The DISCOVERY Channel)
www.audubon.org	(Audubon Society)
www.wilderness.org	(The Wilderness Society)
www.amrivers.org	(American Rivers)
www.biggreen.org	(Big Green)
www.biodiv.org	(Biological Diversity)
www.globalstewards.org	(Global Stewards)
www.scenic.org	(Scenic America)
www.panda.org	(WWF Global Network)

www.americanforests.org (American Forests)

www.nationalgeographic.com (National Geographic Society)

www.epa.gov (Environmental Protection Agency)

www.prairies.org (Prairies Forever)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about: the balance of nature, renewable & nonrenewable natural resources, biological communities, Earth's carrying capacity

talking about: the balance of nature, renewable & nonrenewable natural resources, biological communities, Earth's carrying capacity

writing about: the balance of nature, renewable & nonrenewable natural resources, biological communities, Earth's carrying capacity

making oral reports and audiovisual presentations

creating visual displays (including art work)

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts & crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

www.doi.gov (U.S. Department of the Interior)

www.askeric.org (AskERIC)

www.secondnature.org (Second Nature)

www.earthsystems.org (Earth Systems)

www.envirolink.org (EnviroLink)

www.conbio.rice.edu/vl (The Virtual Library of Ecology & Biodiversity)

www.iwla.org (Izaak Walton League)

ice.ucdavis.edu (Information Center for the Environment)

www.nrdc.org (Natural Resources Defense Council)

www.janegoodall.org (The Jane Goodall Institute)

www.sustainable.doe.gov (U.S. Department of Energy)

www.edf.org (Environmental Defense Fund)

www.ser.org (Society for Ecological Restoration)

www.ericse.org (ERIC Clearinghouse for Science, Mathematics and Environmental Education)

www.tnc.org (The Nature Conservancy)

www.cnie.org/nie (National Library for the Environment)

Lesson Plan: DEFINING THE ENVIRONMENT

STUDENTS ADOPT WILDLIFE

Take a field trip(s) -- to a local/area wildlife sanctuary or zoo to observe various species of birds and animals, and to learn about the various ways that the birds and animals are cared for by trained staffs. Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Meeting(s) with sanctuary/zoo staff members -- to determine ways in which students can help care for endangered species and/or injured creatures. Record data in research logs and on audiotape.

Periodically -- students visit the sanctuary/zoo and assist in the care of birds/ animals. Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while undertaking assigned chores at the sancturay/zoo site(s).

Create visual displays and audiovisual presentations.

MATERIALS

Community resource site(s), community resource people, graphic media devices, research logs, safety gear (e.g., safety glasses, gloves, hats), encyclopedias, Internet web sites, CD-ROM software (etc).

Manning, A. An Introduction to Animal Behavior. London, England: Edware Arnold

National Wildlife Federation. America's Wildlife Sampler. Washington, DC: NWF.

Meeting(s) with community resource people -- to identify a variety of regional nature areas which represent different biomes/ecosystems. Record data in research logs and on audiotape.

Use maps of the region to geographically locate the several nature areas. Data is collected on desktop outline maps.

Take a field trip(s) -- to observe similarities & differences among the several nature areas. Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Periodically -- revisit the several nature areas to observe any/all changes that have occurred as a result of 1) seasons of the year, 2) global warming, 3) precipitation (quantities thereof), 4) Man's intrusion, 5) chemical spraying, 6) ground water contamination (etc). Record data in research logs as well as on film/videotape and audiotape.

Use the ***GlobeScope*** matrix -- to organize and display data.

Create visual displays and audiovisual presentations.

MATERIALS

Community resource sites, community resource people, graphic media devices, research logs, atlases & maps, desktop outline maps, Internet web sites, CD-ROM software, ***GlobeScope*** matrix (etc).

May, R. M. "The Evolution of Ecological Systems," ***Scientific American*** September 1978

ECO-teach Lesson Plan

THEME/TOPIC	Natural Resources
GRADE(S)	Grades 4 - 8
SUBJECT(S)	Earth Science, Geography, Geology, History
DURATION	Five 50-90 minute classes

DATA

Throughput refers to the flow of ***energy*** and ***materials*** needed to keep human-made (***built***) environments functioning.

For a ***renewable natural resource*** -- the ***sustainable rate of use*** can be no greater than the ***rate of regeneration***.

For a ***nonrenewable natural resource*** -- the ***sustainable rate of use*** can be no greater than the ***rate at which a renewable resource, used sustainably, can be substituted for it***.

Renewable resources are living or ***biotic*** resources and nonrenewable resources are nonliving materials. For the renewable resources, ***management*** involves ***practices*** which will result in a ***sustained yield***.

For the nonrenewable resources, good management is chiefly ***wise use with the avoidance of waste***.

Mineral resources are ***limited*** in ***abundance*** and distinctly ***localized*** at places within the Earth's ***crust***; the ***quantity*** of a given ***material*** is rarely known with accuracy; and ***deposits*** of minerals are ***depleted*** by ***mining*** -- and eventually ***exhausted***.

Natural resource ***restoration*** is a ***process*** in which damaged resources or regions are ***renewed***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the diversity of natural resources that exist on/beneath Earth's surface -- on a global scale

ways that human beings use natural resources to enhance the quality of life

ways that human beings use natural resources to enhance/support their life styles

the need to conserve (manage the use of...) Earth's renewable resources

the need to conserve (manage the use of...) Earth's nonrenewable resources

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

types of renewable resources to be found in local/area natural environment(s)

types of nonrenewable resources to be found in local/area environment(s)

ways by which human beings conserve the supply of- and the use of renewable resources

ways by which human beings conserve the supply of- and the use of nonrenewable resources

methods/techniques (and related technology) used to ***harvest*** natural resources.

LESSON OBJECTIVE(S) Students will:

define selected vocabulary and incorporate into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with comunity resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audiovisual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas).

LESSON ACTIVITIES (Each teacher selects from the following options)

Introduction

Students view an audiovisual presentation that depicts the diversity of renewable and nonrenewable natural resources to be found on a global scale

Students view an audiovisual presentation that depicts ways human beings use natural resources

Students view an audiovisual presentation that discusses ways human beings conserve (manage) renewable and nonrenewable resources

Guest speakers discuss any-and-all of the following topics: renewable natural resources, nonrenewable natural resources, resources management and conservation, products made from natural resources, the variety of natural resources to be found in the local/area environment(s)

Students visit natural sites to observe/learn about renewable and nonrenewable resources

Students visit natural sites to observe the ***harvesting*** of natural resources

Students visit factories and mills to observe ways by which natural resources are used in the manufacturing process

Students conduct research studies at selected natural sites

Students bring newspaper articles to class and discuss natural resources

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

Students read about natural resources and their uses by human beings

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected types of natural resources

Students collect data on film/videotape while on field trips -or- conducting research at a field-based site(s)

The teacher uses atlases, maps, globes, CD-ROM software (etc) to teach a geography lesson about the types of natural resources that can be found in selected geographical regions of the Earth

Closure

Students create visual displays related to things/processes observed while on visits to natural sites -or- visits to manufacturing/production sites

Discussions of what was observed/learned while studying natural resources and their use by human beings

Students write essays about their impressions regarding renewable and nonrenewable natural resources

Students write essays about their impressions regarding ways human beings use and conserve/manage natural resources

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS

National Geographic:

"Physical World," v193n5, May 1998, p 2-37

"Hard Rock Legacy," v197n3, March 2000, p 76-95

"Mapping A Pact To Save Ancient Redwoods,"
September 1999

"Striking It Rich In The North Sea,"
April 1977

"Drilling To The Bottom Layer Of Ocean Crust,"
May 1991

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books

INTERNET

www.wri.org (World Resources Institute)

www.nwf.org (National Wildlife Federation)

www.sierraclub.org (Sierra Club)

www.epa.gov (Environmental Protection Agency)

www.wwf.org (World Wildlife Fund)

www.nfwf.org (National Fish & Wildlife Federation)

www.fs.fed.us (USDA Forest Service)

www.edf.org (Environmental Defense Fund)

www.americanforests.org (American Forests)

www.sustainable.doe.gov (U.S. Department of Energy)

www.nrdc.org (Natural Resources Defense Council)

www.globalstewards.org (Global Stewards)

www.amrivers.org (American Rivers)

www.doi.gov (U.S. Department of the Interior)

ASSESSMENT

Students demonstrate acquired knowledge and skills development by:

reading about: renewable and nonrenewable natural resources, ways human beings use natural resources, ways human beings conserve and manage natural resources

talking about: renewable and nonrenewable natural resources, ways human beings use natural resources, ways human beings conserve and manage natural resources

writing about: renewable and nonrenewable natural resources, ways human beings use natural resources, ways human beings conserve and manage natural resources reading about ways human beings exploit and deplete renewable and nonrenewable natural resources

talking about ways human beings exploit and deplete renewable and nonrenewable natural resources

making oral reports and audiovisual presentations

creating visual displays (including art work)

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts & crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

www.aeoe.org (Association for Environmental & Outdoor Education)

www.neeap.uwsp.edu (National Environmental Education Advancement Project)

www.earthwatch.org (EarthWatch)

www.unep.ch (United Nations Environment Programme)

www.naaee.org (North American Association for Environmental Education)

www.nationalgeographic.com/maps (National Geographic Society)

ice.ucdavis.edu (Information Center for the Environment)

www.outdoors.org (Appalachian Mountain Club)

www.geologylink.com (Geology Link)

Lesson Plan: NATURAL RESOURCES

STUDENTS SURVEY AREA'S NATURAL RESOURCES

Use maps -- to determine the geographical location of selected natural resources.

Take field trips -- to geographical locations of selected natural resources. Observe the physical structure and characteristics of each geographical location -- data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while visiting each geographical site.

Observe the various types of natural resources that are found at each of the selected geographical locations -- data is recorded in research logs. Data is collected on film/videotape and audiotape recorders.

Observe various natural resource ***harvesting*** techniques/equipment used at each of the selected geographical locations -- data is recorded in research logs. Data is collected on film/videotape and audiotape recorders.

Observe ways in which the natural condition of each selected geographical location/ surrounding area is affected by natural resource harvesting techniques/equipment. Data is recorded in research logs. Data is collected on film/videotape and audiotape recorders.

MATERIALS

Community resource sites, graphic media devices, research logs, safety gear worn at various sites (e.g., hard hats, safety glasses, coveralls, footwear), maps, compasses (etc).

Corcoran, E. "Cleaning Up Coal," ***Scientific American*** May 1992

Flavin, C. "The Bridge to Clean Energy," ***WorldWatch*** v5n4, July- August 1999

Maxwell, J. "Swimming with Salmon," ***Natural History*** September 1995

Monastersky, R. "The Mother Lode of Natural Gas," ***Science News*** v150, November 1996

Young, J. E. "Mining the Earth," ***WorldWatch*** 1992

STUDENTS SURVEY USES OF NATURAL RESOURCES

Take field trips -- to local/area factories, mills, lumber yards (etc) to observe ways by which various natural resources are used in goods-production processes. Data is recorded in research logs.

IF PERMITTED AT THE PRODUCTION SITES -- use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds.

Create visual displays and audiovisual presentations that describe the various types of local/area natural resources which are harvested/used in goods-production processes.

Create visual displays and audiovisual presentations that describe the various commercial goods that are made from local/area natural resources.

Create a report that describes the importance of local/area natural resources to the economic development/well-being of the community/communities. THE REPORT CAN BE IN A WRITTEN FORMAT, ON FILM/VIDEOTAPE, ON AUDIOTAPE, IN POSTER FORM (ETC).

MATERIALS

Community resource sites/production facilities, graphic media devices, research logs, safety gear (hard hats, safety glasses, ear plugs, coveralls, footwear) (etc).

ECO-teach Lesson Plan

THEME/TOPIC	NATURE in Art, Music & Literature
GRADE(S)	Grades 4-8
SUBJECT(S)	Fine Arts, History, Language Arts, Sociology
DURATION	Three to Five 50-90 minute classes

DATA

The true ***character*** of ***art*** can be ***revealed*** only by patiently ***exploring*** the ***complexities*** of ***visual relations*** and ***strands of meanings*** within a ***context*** of ***time*** and ***place.***

From ***prehistoric*** art (***representations*** of ***creatures*** that Man hunted in order to ***sustain*** his life) through pre-Han ***landscape*** art (China), ***Roman*** wall paintings (representing the ***physical world*** -- utilizing the ***effect*** of light ***falling upon***- and ***reflecting from solid objects***), late 18th century landscape ***paintings*** (England), to Frederick Church's ***view*** of landscape painting as a ***means*** of understanding ***nature*** -- ***topography*** and ***vegetation***, attempts were made to create ***factual pictures*** -- seeing a kind of ***visual inventory*** of ***lifespace environments.***

Man ***relates*** with his environment(s) in order to meet ***basic needs.*** Exactly how he relates with his ***surroundings*** is ***determined*** largely by his ***culture.*** As a ***painter*** may ***observe*** a hundred ***sunsets*** and put on ***canvas*** a ***composit*** that draws ***features*** from each -- but ***blends*** them into something new, a ***composer*** works with his materials to ***produce*** in the ***audience sequences*** of ***emotional states.***

Forests and ***rivers*** have throughout ***the ages inspired*** great ***poets*** and composers -- Ferde Grofe's ***depiction*** of the Grand Canyon; where the Colorado River ***meanders*** through ***majestic canyons*** and ***empties*** into the Gulf of California. Music and songs (words by poets and ***lyricists***) are ways that individuals ***communicate*** their ***experiences*** with nature as well as their ***feelings*** about the ***aesthetic value*** of nature to other human beings.

J. B. Jackson defined ***wilderness*** as that ***terrain*** with little or no ***historic evidence*** of ***human manipulation*** -- whether it be ***virgin forest, desert,*** or ***alpine summit.*** There is a quality of mystery about the wilderness. ***Natural surroundings*** provide a ***setting*** for ***man's exploits***; ***environmental characteristics*** that have great ***impact*** upon what Man does, how he does those things acted upon, and why he does the things that ***chronicle*** his ***presence*** in given ***geographical locations*** at particular ***moments in time.***

Literary writers use nature as a ***theme,*** and ***natural settings*** as ***backdrops*** for fictionalized histories, adventure, romance, intrigue, and modern-day morality plays (e.g., Pearl Buck's The Good Earth, Jack London's Call of the Wild, Ernest Hemmingway's Old Man and the Sea, Herman Melville's Moby Dick, Zane Grey's Riders of the Purple Sage, Louis L'Amour's The Sacketts novels, Edgar Rice Burrough's Tarzan the Ape Man novels, James Fenimore Cooper's Leatherstocking Tales and Last of the Mohicans).

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UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

various ways that human beings express their inner-most feelings and awe of nature

art -- as a medium of self-expression

music -- as a medium of self-expression

literature -- as a medium of self-expression

various attempts by artists, composers, and writers to capture the essence of nature on canvas, in song, or on the printed page

the works of selected artists, composers, and writers.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

Nature -- as represented in drawings and paintings

Nature -- as captured on film and/or videotape

Nature -- as characterized in music and song

Nature -- as described in prose and verse

the interaction(s) between Man and Nature -- as represented in art; as characterized in music and song; as described in prose and verse.

LESSON OBJECTIVE(S) Students will:

define selected vocabulary and incorporate words/terms into conversations, discussions, debates, sentences, paragraphs, essay test item responses, written reports, oral reports, visual displays, audiovisual presentations, poems, songs, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audio-visual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models).

LESSON ACTIVITIES (Each teacher selects options from the following ***learning encounters menu***)

Introduction

Students view an audiovisual presentation that shows an artist creating a charcoal drawing, water-color, or oil painting of a natural scene

Students view an audiovisual presentation that contains an interview with a song writer/composer

Students view an audiovisual presentation that contains an interview with a writer

Guest speakers: read passages from children's books, short stories, poems, and novels -- related to Nature themes; present drawings and paintings to the class and discuss techniques -- related to Nature scenes; sing songs and play music -- related to Nature themes; conduct arts&crafts classes -- directly involving students in the creation of pieces of art work -- related to Nature themes; bring flora and fauna to the classroom and describe how these living organisms can be immortalized in pigment, lyric, and verse

Students go on field trips to artists' studios, to art galleries, to music recording studios, to libraries, to literary club meetings, to musicals, to motion picture theatres (etc)

Students conduct research at field-based sites -- doing original drawings at nature sites -- accompanied by artists, watching/ listening to painters, sculptors, song writers, poets, writers of prose (etc)

Students bring short stories and novels to class -- related to Nature themes -- and discuss passages read

The teacher introduces poems, short stories, novels to the class and reads/discusses passages -- related to Nature themes.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the guest speakers' presentations -- with related notetaking

A discussion of stories/passages read aloud by the teacher, and the images of Nature that came to mind while the teacher read

A discussion of things seen while on field trips to artists' studios, museums, art galleries, musicals, stage plays, music recording studios, motion picture theatres (motion picture studios -- if to be found in the local/area environment(s)

Students draw pictures of things seen while on field trips to Nature sites

Students collect data on film/videotape while on field trips -or- conducting research at field-based sites

Working in small groups, students use dictionaries to define key words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate the actual natural sites used as backdrops in selected drawings/paintings, musicals and songs, poems and literary works. Data is recorded on desktop outline maps

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: actual geographical locations (sites) depicted in drawings/paintings, music/song, prose/verse.

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Students create original drawings/paintings; compose songs; write music; write poems and stories about things seen at Nature sites -- while on field trips -or- conducting research at field-based sites

Students talk about/write about their impressions of things seen at Nature sites -- while on field trips -or- conducting research at field-based sites (etc).

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **Nature** on PBS

Episodes of **National Geographic EXPLORER on TBS, CNBC**

Selected programs on ... The LEARNING Channel (TLC)

Selected programs on ... The DISCOVERY Channel

National Geographic:

"American Wilderness," v194n4, October 1998, p 2-33

"Winslow Homer: American Original," v194n6, December 1998, p 72-101

"Ancient Art of the Sahara," v195n6, June 1999 p 98-119

"Sahara's Prehistoric Art," v196n3, September 1999 p 82-89

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.artecology.org	(Art Ecology)
www.scenic.org	(Scenic America)
www.wilderness.org	(The Wilderness Society)
www.wildrockies.org/picturetomorrow	(Wild Rockies)
www.globalart.org	(Global Art in Action)
www.iwla.org	(Izaak Walton League)
www.wildflower.org	(The Lady Bird Johnson Wildflower Center)
www.mobot.org	(Missouri Botanical Garden)
www.biodiv.org	(Biological Diversity)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading adventure stories, intrigue, fictionalized histories (etc) set in natural environments reading about: famous artists, song writers/composers, and writers of prose and verse

talking about: natural settings depicted in art, music, literature as well as famous artists, song writers/ composers, and writers of prose/verse

writing about: natural settings depicted in art, music, literature as well as famous artists, song writers/ composers, and writers of prose/verse

making oral reports and audiovisual presentations

making original works of art: drawings/paintings, arts&crafts, music, songs, poems, short stories (etc)

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

using graphic media devices (cameras and video-tape equipment) to collect data

using the Internet to collect data

notetaking

map making

maintaining a portfolio -- evidence of achievement and knowledge/skills development over time.

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts&crafts objects

Create original drawings/paintings

Make visual displays

WEB SITE RESOURCES FOR TEACHERS

www.askeric.org	(AskERIC)
www.secondnature.org	(Second Nature)
www.njcc.com/~ecopics	(Environmental Graphics & Photos)
www.asle.umn.edu	(The Association for the Study of Literature and Environment)
www.enviroliteracy.org	(Environmental Literacy Council)
www.bn.com	(Barnes & Noble)

www.efn.org (Good Green Fun)

www.nea.gov (National Endowment for the Arts)

www.neetf.org (National Environmental Education & Training Foundation)

www.projectwild.org (Council for Environmental Education)

www.naturenet.org (Nature Network)

www.npca.org (National Park Conservation Association)

www.janegoodall.org (The Jane Goodall Institute)

www.audubon.com (Audubon Society)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: NATURE IN ART, MUSIC & LITERATURE

STUDENTS COMPOSE A SYMPHONY TO NATURE

Take field trips -- to selected nature sites to observe the character and composition of each natural environment (e.g., flora, fauna, sounds, smells, hydrosphere). Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trips.

Take field trips -- to museums, art galleries, landscape photography exhibits, travel agencies (etc) to observe/learn about the characteristics of diverse natural environments/sites that are nearby/close to home and distant/far-removed. Record data in research logs and on audiotape.

Meeting(s) with global travelers, photographers, artists (etc) -- to observe/understand the unique characteristics of diverse natural environments that are nearby/close to home and distant/far-removed. Record data in research logs and on audiotape.

Draw pictures of things observed/heard while at selected nature sites.

Draw pictures of things observed while at museums, art galleries, exhibits (etc).

Collaborate with local/area musician(s) or music teacher -- to create a *symphony to nature* which symbolizes the sights & sounds of the wild and dramatizes the unique character of diverse environments.

The symphony is performed for parents, other students in the school, and for the general public in the local/area communities.

MATERIALS

Community resource sites, community resource people, graphic media devices, research logs, art supplies, musical instruments (etc).

STUDENTS' IMPRESSIONS OF NATURE

Take field trips -- to art museums, art galleries, artists' studios, photography exhibits (etc) to observe and understand individual artist's impressions of the things that they see in Nature and the emphasis that each artist places upon specific qualities of selected environments (e.g., flora, fauna, inorganic objects, the hydrosphere). Attention is paid to the variety of mediums used by artists to visually portray aspects of Nature and to convey their inner most feelings to others.

Take field trips -- to nature sites to observe, first hand, environmental surroundings and to note specific phenomena as well as distinct/diverse sounds.

Meeting(s) with painters, sculptors, photographers (etc) -- to discuss/learn about *perspective, realism, impressionism, texture, medium, techniques* (etc).

Collaborate with local/area artists and/or the art teacher(s) -- to create ***visual essays on Nature*** -- using film, videotape, canvas (etc).

MATERIALS

Community resource sites, community resource people, graphic media devices, artist's supplies (e.g., paints, canvas, brushes, molding clay), art books, motion picture film-still photography film-video tapes (etc).

Peters, R. "The Graphic Studies Approach," ***Audiovisual Instruction*** April 1971

STUDENTS WRITE ODES TO NATURE

Read poems and short stories written with aspects of Nature as their backdrop.

Meeting(s) with poets, writers (etc) -- to disucss/learn about *perspective, style, setting, characters, plot, setting, period* (history) (etc).

Meeting(s) with conservationists, environmentalists, hikers-backpackers, sportsmen, naturalists (etc) to understand the varied nature of wilderness areas, to understand natural processes that occur in the environment, to understand the characteristics of varied species of flora & fauna (etc).

Take field trips -- to nature sites/wilderness areas to observe surroundings, to observe phenomena (e.g., flora, fauna, rocks, fungi, bodies of water), to listen for the sounds of nature, to sense the aromatic texture of Nature (etc). Use graphic media devices (cameras and videotape equipment) to collect images and sounds.

Write poems and lyric poems.

Write short stories.

Write a one-act play.

MATERIALS

Community resource sites, community resource people, books/novels, poetry, sheet music, records-cassette tapes-CDs, graphic media devices, dictionaries, thesauruses, encyclopedias, histories, atlases & maps, paintings & drawings (etc).

Paulson, R. Literary Landscape: Turner and Constable.
New York, NY: Yale University Press

Peters, R. "Creative Writing and the Middle Grades Social Studies Curriculum," ***The Texas Writer's Newsletter*** Spring 1995

"Nurturing an Environmental and Social Ethic," ***Childhood Education*** Winter 1993

Humans, Nature, Places, and Things: An **ECO/SOCIAL Studies** View of the World. ***ERIC*** 1994 ED 363 559

MAN In His World. ***ERIC*** 1978 ED 144 790

Basic Skills & Competencies: Language Arts. ***ERIC*** 1977 ED 151 802

Strategies To Affect Student Sensory Awareness of the Environment: Kindergarten - Grade Three. ***ERIC*** 1976 ED 125 838

Strategies To Affect Student Sensory Awareness of the Environment: Grades Four - Six. ***ERIC*** 1976 ED 134 362

Strategies To Affect Student Sensory Awareness of the Environment: Grades Seven - Twelve. ***ERIC*** 1976 ED 134 363

"To Perceive the Urban Environment," ***The Journal of Environmental Education*** Winter 1971

ECO-teach Lesson Plan

THEME/TOPIC	Earth's Carrying Capacity
GRADE(S)	Grades 5-12
SUBJECT(S)	Biology, Botany, Earth Science, Geography, Geology, History, Sociology
DURATION	Five 50-90 minute classes

DATA

There are over 4.5 billion human beings on the face of the earth. The ***availability*** of ***natural resources*** for Man's use is related to four factors: the ***physical amount*** of resources contained in the earth; the ***technology*** of ***resource use***; the ***quality of the environment*** -- the absence of resource ***pollution*** and ***despoliation***; the number of human beings ***consuming*** resources. ***Nonrenewable*** resources are being ***exhausted*** at an alarming rate, and we are ***destroying*** the ***capability*** of the ***planet ecosystem*** to ***renew*** the ***supply*** of ***renewable*** resources. ***The Earth is finite*** !

The environment cannot ***sustain*** the ***scale*** at which the human ***population*** and ***economy extract*** resources from the earth. ***Carrying capacity*** refers to ***Earth's ability to support living organisms in given geographical regions***. There is ***ample evidence*** of Man's ***disregard*** for the ***finite nature*** of Earth's renewable and nonrenewable resources -- whether on land or in water. ***Stress*** upon Earth's ecosystem results in a diminished capacity to support life on the planet.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

Earth's ecosystem

the wealth of Earth's natural resources

the fact that Earth is finite

the concept: carrying capacity

global efforts made by human beings to safeguard Earth's carrying capacity.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the diversity of Earth's natural resources found in the local/area environment(s)

the condition of Earth's carrying capacity in the local/area environment(s)

efforts made by human beings, in the local/area environment(s) as well as on a global scale, to ensure the conservation of natural resources -- thus safeguarding Earth's carrying capacity

ATTENTION will be focused on conditions and situations, in the local/area environment(s) as well as on a global scale, which have an adverse effect upon Earth's carrying capacity.

LESSON OBJECTIVE(S)

Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using ***graphic media devices*** to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audiovisual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas).

LESSON ACTIVITIES (Each teacher will select from the following options)

Introduction

Students view an audiovisual presentation dealing with worldwide human population growth -- and growth-related problems which impact upon natural and ***built*** environments

Students view an audiovisual presentation that investigates global regions -- focusing on geographical characteristics and available resources

Students view an audiovisual presentation that describes Man's attempts to conserve and manage Earth's resources -- plans and programs

Students view an audiovisual presentation that describes Man's exploitation of Earth's resources and the resulting degradation of the natural environment(s)

Guest speakers discuss: human population growth -- and related problems; Earth's natural resources; Man's conservation and stewardship efforts; Man's misuse of nature's resources and his harmful effects upon Earth's ecosystem

Students go on a nature walk and observe phenomena/processes, the topography, evidence of Earth's carrying capacity

Students visit natural sites and conduct research studies

Students bring newspaper articles to class and discuss: human population growth, Earth's resources, conservation policies and programs, conflicts/issues/problems/situations regarding Earth's carrying capacity

Students watch ***live*** news events (related to the lesson theme/topic) on cable television in the classroom.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events viewed on cable television -- with related notetaking

Students read about: human population growth, geographical regions of the earth, natural resources, conservation issues and policies, carrying capacity

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected geographical regions. Data is recorded on desktop outline maps

Students collect data on film/videotape while on a nature walk -or- conducting research at a field-based site

The teacher uses atlases, maps, globes, CD-ROM software (etc) to teach a geography lesson about: the distribution of Earth's human population -- by continents and nations; the topography of selected regions of the Earth; the location of Earth's natural resource deposits (e.g., coal, oil, gold, silver, copper)

Closure

Students create visual displays related to things seen/heard while on a nature walk -or- conducting research at a field-based site

Discussions of what was observed/learned while studying: human population growth & distribution, the physical characteristics of selected global regions, Earth's resources, resources conservation efforts

Students write essays about their impressions of topics studied: human population, Earth's resources, Earth's topography, resources conservation strategies, Earth's carrying capacity

Students draw pictures of things observed while on a nature walk -or- conducting research at a field-based site

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS

Episodes of **Nature** on PBS

National Geographic:

special issue: **Making Sense of the Millennium**
v193n1, January 1998

"Physical World," v193n5, May 1998, p 2-37

"Population - Human Migration," v194n4, October 1998, p 2-35

"Population - Feeding the Planet," v194n4, October 1998, p 56-75

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books

INTERNET

www.epa.gov (Environmental Protection Agency)

www.wri.org (World Resources Institute)

www.usgs.gov (U.S. Geological Survey)

www.fs.fed.us (USDA Forest Service)

www.globalstewards.org (Global Stewards)

www.conservationfund.org (Conservation Fund)

www.americanforests.org (American Forests)

www.edf.org (Environmental Defense Fund)

www.earthsystems.org (Earth Systems)

www.amrivers.org (American Rivers)

www.conservation,org (Conservation International)

www.holidayjunction.com/acn/acnhome.html (Aquatic Conservation Network)

ASSESSMENT

Students demonstrate acquired knowledge and skills development by:

reading about: human population growth/migration, physical characteristics of Earth's topography, natural resources, Man's resources conservation efforts, Man's exploitation of Earth's resources, Earth's carrying capacity

talking about: human population growth/migration, physical characteristics of Earth's topography, natural resources, Man's resources conservation efforts, Man's exploitation of Earth's resources, Earth's carrying capacity

writing about: human population growth/migration, physical characteristics of Earth's topography, natural resources, Man's resources conservation efforts, Man's exploitation of Earth's resources, Earth's carrying capacity

making oral reports and audiovisual presentations

creating visual displays (including art work)

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts & crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

www.ericse.org	(ERIC Clearinghouse for Science, Mathematics and Environmental Education)
www.secondnature.org	(Second Nature)
www.cnie.org	(National Library for the Environment)
www.environmentaldirectory.net	(Environmental Directory Network)
www.shell.com/Explore	(Shell Corporation)
www.janegoodall.org	(The Jane Goodall Institute)
www.unep.ch	(United Nations Environment Programme)
www.nationalgeographic.com	(National Geographic Society)
www.ser.org	(Society for Ecological Restoration)
www.doi.gov	(U.S. Department of the Interior)
www.globe.gov	(The GLOBE Program: Global Learning and Observations to Benefit the Environment)
www.zpg.org	(Zero Population Growth)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: EARTH'S CARRYING CAPACITY

STUDENTS MONITOR LOCAL/AREA HUMAN POPULATION GROWTH

Research primary and secondary sources -- to understand the history of human population growth in the immediate region. Record data in research logs.

Research primary and secondary sources -- to understand the impact of human population growth in the immediate region upon Nature's ability/capacity to sustain life and to provide for Man's materialistic lifestyle demands. Record data in research logs.

Take a field trip(s) -- to natural and ***built*** environments in the region to better understand 1) Man's growing demands upon Earth's carrying capacity and 2) Man's adverse effect(s) upon the health and well-being of the natural environment. Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Meeting(s) with neighborhood groups, conservation and environmental group representatives, business representatives, elected officials (etc) to understand the impact that human beings have/have had upon the local/area eviroments. Record data in research logs and on audiotape.

Create visual displays and audiovisual presentations.

MATERIALS

Community resource site(s), community resource people, graphic media devices, research logs, primary sources (e.g., maps, letters, photographs, diaries, journals, logs, newspapers), encyclopedias, newspapers & magazines, Internet web sites, CD-ROM software (etc).

Arrow, K. "Economic Growth, Carrying Capacity, and the Environment," ***Science*** v268 April 1995

Brown, L. "Facing Food Scarcity," ***WorldWatch*** v8n6 December 1995

Cohen, J. E. "Population Growth and Earth's Human Carrying Capacity," ***Science***, v269 July 1995

Power, T. M. "The Wealth of Nature," ***Issues in Science and Technology*** Spring 1996

Raloff, J. "The Human Numbers Crunch," ***Science News*** v149 June 1996

STUDENTS CONDUCT STUDY AMONG IMMIGRANTS

Research contemporary literature (e.g., books, encyclopedias, newspapers, magazines) as well as Internet web sites -- to understand current United States immigration policies and to understand reasons why people from all over the world continue to immegrate to the United States. Record data in research logs.

Locate the countries/nations from which immigrants came -- to the local/area communities -- on desktop outline maps.

Meeting(s) with recent immigrants -- to understand reasons why they left their native lands, 2) to understand the problem(s) related to increasing human numbers in their native lands, 3) to understand problems related to insufficient supplies of food in their native lands, 4) to understand some of the 'adjustment to a new society' problems recent immigrants faced in local/area communities. Record data in research logs and on audiotape.

Create visual displays and audiovisual presentations.

MATERIALS

Community resource people, graphic media devices (audiotape recorders), research logs, encyclopedias, atlases & maps, desktop outline maps, CD-ROM software, print materials, Internet web sites (etc).

Brown, L. "Facing Food Scarcity," ***WorldWatch*** v8n6 December 1995

Cohen, J. E. "Population Growth and Earth's Human Carrying Capacity," ***Science***, v269 July 1995

Raloff, J. "The Human Numbers Crunch," ***Science News*** v149 June 1996

ECO-teach Lesson Plan

THEME/TOPIC	Habitat & Species
GRADE(S)	Grades 5-12
SUBJECT(S)	Biology, Botany, Geography, Geology, History
DURATION	Five 50-90 minute classes

DATA

Biological diversity (***biodiversity***) is a global ***resource*** made up of the ***variety*** and ***variability*** of ***life forms*** on Earth.

Natural communities each have their own ***characteristic*** biodiversity -- numbers and ***compositions*** of ***species***. The ***well-being*** of ***wildlife*** depends largely on the ***condition*** of its ***habitat***.

Wildlife habitats are areas wherein ***nondomesticated*** species find the food, water, and other resources they need to ***survive***. No ***organisms*** occur in all habitats, and most have narrow habitat ***requirements***.

Stress in the ***biological community reduces*** biodiversity. The ***fragmentation*** of habitats leaves ***remnants*** no longer ***connected*** to larger ***wilderness*** and therefore species are lost over time. When habitats are ***destroyed***, ***populations*** and, eventually, species ***inevitably*** become ***extinct***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the biological diversity of Earth's ecosystem the characteristics of diverse natural communities

the characteristics and traits of diverse species

the physical composition of the habitats of selected species

Man's efforts to prevent the destruction of species' habitats -- thus minimizing or preventing the further extinction of species.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the diversity of natural ecosystems found in the local/area environment(s)

the characteristics of biological communities found in the local/area environment(s)

the characteristics and traits of selected species found in the local/area environment(s)

the physical composition of the habitats of selected species -- found in the local/area environment(s)

local/area attempts by Man to minimize or prevent the further extinction of species.

LESSON OBJECTIVE(S)

Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc) use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using ***graphic media devices*** to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audio-visual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas).

LESSON ACTIVITIES (Each teacher will select from the following options)

Introduction

Students view an audiovisual presentation that describes natural ecosystems that are found nearby/close to home and distant/far-removed

Students view an audiovisual presentation that describes the characteristics of selected biological communities that are found nearby/close to home and distant/far-removed

Students view an audiovisual presentation that describes the characteristics and traits of selected species (fauna) that are found nearby/close to home and distant/far-removed

Students view an audiovisual presentation that describes the physical composition of the habitats of selected species (flora) (fauna) that are found nearby/close to home and distant/far-removed

Students view an audiovisual presentation that describes efforts made by Man to minimize or prevent the further extinction of species (flora) (fauna) that are found nearby/close to home and distant/far-removed

Guest speakers discuss: natural ecosystems, biological communities, species' characteristics & traits, habitat characteristics, conservation efforts

Students go on a nature walk and observe the characteristics of: ecosystems, biological communities, species & habitats, conservation efforts (programs/projects)

Students visit natural site(s) and conduct research studies

Students bring newspaper articles to class and discuss: ecosystems, biological communities, species & habitats, conservation efforts (programs/projects)

Students watch ***live*** news events (related to the lesson theme/topic) on cable television in the classroom.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the *live* news events viewed on cable television -- with related notetaking

Students read about: natural ecosystems, biological communities, species & habitats, conservation efforts (programs/projects)

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected natural ecosystem sites, selected biological communities, and selected (flora) (fauna) habitats. Data is recorded on desktop outline maps

Students collect data on film/videotape while on a nature walk -or- conducting research at a field-based site(s)

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: natural ecosystem(s) OR biological communities OR species & habitats OR conservation programs/projects

Closure

Students create visual displays related to things seen/heard while on a nature walk -or- conducting research at a field-based site

Discussions of what was observed/learned while studying: ecosystems, biological communities, species & habitats, conservation programs/projects

Students write essays about their impressions of topics studied: ecosystems, biological communities, species & habitats, conservation programs/projects

Students draw pictures of things observed while on a nature walk -or- conducting research at a field-based site

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS

Episodes of **Nature** on PBS

The DISCOVERY Channel

National Geographic:

special issue: **Biodiversity - The Fragile Web**
v195n2 February 1999

"Physical World," v193n5, May 1998, p 2-37

"America's Wilderness," v194n5, October 1998, p 2-33

"Icebound Islands of Nunataks," v194n6, December 1998 p 60-71

"Polar Bears," v193n1, January 1998, p 52-71

"The Vanishing Prairie Dog," v193n4, April 1998, p 116-131

"Ants & Plants," v197n5, May 2000, p 84-97

"Canyon Country," v196n1, July 1999, p 94-109

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.audubon.org	(Audubon Society)
www.wilderness.org	(The Wilderness Society)
www.defenders.org	(Defenders of Wildlife)
www.americanforests.org	(American Forests)
www.panda.org	(World Wildlife Federation Global Network)
www.biodiversity.environment.gov.au	(Biodiversity Group)
www.bdt.org.br/bin21/bin21.html	(Biodiversity Information Network)
www.csf.colorado.edu/consbio	(Conservation Biology)
www.biodiv.org	(Biological Diversity)
www.mwnta.nmw.ac.uk/ite	(Institute of Terrestrial Ecology)
www.nwf.org	(National Wildlife Federation)
www.sierraclub.org	(Sierra Club)

www.epa.gov	(Environmental Protection Agency)
www.tnc.org	(The Nature Conservancy)
www.americanbirding.org	(American Birding)
www.nfwf.org	(National Fish and Wildlife Federation)
www.fs.fed.us	(USDA Forest Service)
www.doi.gov	(U.S. Department of the Interior)
www.ser.org	(Society for Ecological Restoration)
www.janegoodall.org	(The Jane Goodall Institute)
www.sdsc.edu/ESA/esa.htm	(The Ecology Society of America)
www.predatorconservation.org	(Predator Conservation Alliance)

ASSESSMENT

Students demonstrate acquired knowledge and skills development by:

reading about: ecosystems, biological communities, species & habitats, conservation programs/projects

talking about: ecosystems, biological communities, species & habitats, conservation programs/projects

writing about: ecosystems, biological communities, species & habitats, conservation programs/projects

making oral reports and audiovisual presentations

creating visual displays (including art work)

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts & crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

www.earthsystems.org (Earth Systems)

www.amrivers.org (American Rivers)

www.conbio.rice.edu/v1 (The Virtual Library of Ecology and Biodiversity)

www.webcom.com/ˋiwcwww (International Wildlife Coalition)

www.iwla.org (Izaak Walton League)

www.ericse.org (ERIC Clearinghouse for Science, Mathematics and Environmental Education)

www.unep.ch (United Nations Environment Programme)

www.durangonaturestudies.org (Durango Nature Studies)

www.naaee.org (North American Association for Environmental Education)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: HABITAT & SPECIES

STUDENTS MAKE A TERRARIUM

Take a field trip -- to observe biome exhibits in a museum of natural history, to observe biome exhibits at an aviary OR to observe the environmental surroundings at a selected nature site.

Select a biome (e.g., desert, grassland, woodland, wetland, rainforest, alpine mountain) and make a terrarium version of that ecosystem.

BEFORE-DURING-AFTER terrarium development/plant growth photographs -- presented as a visual display.

Observe seed germination and flowering -- record data in research logs.

MATERIALS

Seeds, plants, fish tank -or- large glass fish bowl, sand-dirt-potting soil, plant food, watering can(s), sunlight, water (etc). Turtles, tree toads, worms, snakes, mice, snails (etc) are optional.

Birdseye, C. Growing Woodland Plants. New York, NY:
Oxford University Press

STUDENTS MAKE AN ANT FARM

Construct an ant farm.

BEFORE-DURING-AFTER ant colony establishment photographs -- presented as a visual display.

Observe ants' behavior and daily routines -- record data in research logs.

MATERIALS

Metal or wood frame, 2 panes of glass, dirt or soil, ants, food (etc).

STUDENTS MAKE AN AQUARIUM

Take a field trip -- to an aquarium, to a pet store, to a marine research laboratory OR to a fresh water fish breeding farm or station. Observe/ learn about the raising of fish, fish habits, the physical structure and characteristics of an aquarium environment (etc).

Select either a fresh water or salt water environment.

Identify fish, amphibians, aquatic plants appropriate for either a fresh water or salt water environment.

BEFORE-DURING-AFTER aquarium construction photographs -- presented as a visual display.

Observe aquatic life behavior and routines at feeding time and during other times of day -- record data in research logs.

MATERIALS

Fish tank, fish (various species), amphibians, aquatic plants, stones and/or gravel, ceramic or wood sculptures, filter system, chemicals, food (etc).

ADDITIONAL READINGS

Odum, H. T. Systems Ecology: An Introduction. New York, NY: Wiley & Sons

Wilson, E. O. "The Diversity of Life," ***Discover*** September 1992

ECO-teach Lesson Plan

THEME/TOPIC	BIOME: Deserts
GRADE(S)	Grades 7-12
SUBJECT(S)	Biology, Botany, Earth Science, Geography, History
DURATION	Five 50-90 minute classes

DATA

A ***biome*** is a major ***community*** (***flora***) (***fauna***) located on a specific ***continental sub-division*** of the ***lithosphere*** (solid portion of the earth). Biomes are defined by ***combinations*** of ***physiognomy*** (***vegetation structure***) and ***environment***. Six major physiognomic ***types*** of ***land communities*** are: ***forest, grassland, woodland, shrub-land, semidesert scrub, desert.***

Deserts are water-controlled ***ecosystems*** with ***infrequent, discrete*** and largely ***unpredictable*** water ***inputs***. The major deserts of the world are found in the ***western United States, central China, Australia, North Africa,*** the ***Middle East, India.***

Deserts are ***characterized*** by ***intense solar radiation, high air temperatures, extremely high soil surface temperatures.*** High ***insolation*** in the desert environment causes ***rapid evaporation*** of pond water and high water temperatures. ***Desert plants*** have ***deep root development***, small ***specialized leaves,*** and large ***succulent bodies*** without leaves.

Aestrivation describes a ***condition*** of ***prolonged dormancy*** in ***vertebrate*** animals -- ***metabolic rate*** and ***body temperature*** are ***significantly reduced.*** Flora and fauna types include: prickly pear and cactus varieties; ***arthropods*** such as beetles, scorpions, locust; ***amphibians*** such as frogs; ***reptiles*** such as lizards, snakes; ***birds*** such as quail, road runners; ***mammals*** such as cactus mouse, bobcat, lynx, fox.

The ***plumage*** of birds acts as a protection or ***thermal shield*** against ***excessive*** solar radiation, high air temperatures, and high soil surface temperatures. Both plants and animals employ ***water storage*** as a ***mechanism of defense*** against ***prolonged droughts*** in the deserts. ***Color*** in animals and birds ***serves as camouflage*** and as ***modification*** of the ***effect*** of thermal radiation.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the characteristics of diverse biomes

major physiognomic types of land communities

the characteristics and physical structure of desert environments

desert flora and fauna

natural protections that desert fauna have against intense solar radiation, high air temperatures, extremely high soil surface temperatures, droughts.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the characteristics and physical structure of desert environments -- nearby/close to home and distant/far-removed

diverse types of desert flora -- some of which may grow nearby/close to home

diverse types of desert fauna -- some of which may live nearby/close to home

natural protections that desert fauna have against harsh climatic conditions

LESSON OBJECTIVE(S)

Students will:

define selected vocabulary and incorporate words/terms into conversations, discussions, debates, sentences, paragraphs, essay test item responses, written reports, oral reports, visual displays, audiovisual presentations, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audio-visual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models).

LESSON ACTIVITIES (Each teacher selects options from the following ***learning encounters menu***)

Introduction

Students view an audiovisual presentation that describes the characteristics and physical structure of desert environments

Students view an audiovisual presentation that describes varieties of desert flora (plants)

Students view an audiovisual presentation that describes varieties of desert fauna (animals)

Students view an audiovisual presentation that describes human adaptation to desert environments -- culture traits

Guest speakers discuss: characteristics and physical structure of deserts, the location of selected global deserts, types of desert flora, types of desert fauna, human adaptation to desert environments (etc)

Students go on field trips to desert environments (if possible) OR visit a museum of natural history OR visit a zoo -- to observe the physical structure. characteristics, flora, fauna of desert environments

Students conduct research at field-based sites -- desert environments, museums of natural history, zoos (etc)

Students bring newspapers/magazines to class and discuss: global deserts, human adaptation to desert environments, desert resources, desert flora, desert fauna (etc)

Students watch theme/topic-related ***live*** news events or documentaries on cable television.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

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A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: global deserts, the physical structure and characteristics of deserts, desert flora, desert fauna, human adaptation to desert environments, natural resources (etc)

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected deserts. Data is recorded on desktop outline maps

Students collect data on film/videotape while on field trips -or- conducting research at selected field-based sites

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: global deserts.

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying: global deserts, physical structure and characteristics, desert flora, desert fauna, human adaptation to desert environments (etc)

Students write essays about their impressions of: desert environments, desert flora and fauna, human adaptation -- cultures and lifestyles (etc).

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **Nature** on PBS

Episodes of **National Geographic EXPLORER** on TBS, CNBC

The DISCOVERY Channel

National Geographic:

special issue: **Making Sense of the Millennium**
v193n1 January 1998

"Antarctic Desert," v194n4, October 1998, p 120-135

"Sahara," v195n3, March 1999, p 2-33

"Ancient Art of the Sahara," v195n6, June 1999, p 98-119

"Sahara's Prehistoric Art," v196n3, September 1999, p 82-89

Aramco World:

"Saudi Arabia's Desert Caves," v51n2, March/April 2000, p 26-31

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.miragemall.com (Lower Sonoran Desert)

www.desertusa.com (Desert USA)

www.blm.gov/education/artic/artic.html (Alaska's Cold Desert)

www.saudiaramco.com (Saudi Aramco)

www.drylands.nasm.edu:1995 (Dry Lands)

www.nationalgeographic.com/maps (National Geographic Society)

www.doi.gov (U.S. Department of the Interior)

www.shell.com/Explore (Shell Corporation)

ASSESSMENT

Students demonstrate acquired knowledge and skills development by:

reading about: global deserts, the physical structure and characteristics of deserts, desert flora, desert fauna, human adaptation to desert environments, natural resources (etc)

talking about: global deserts, the physical structure and characteristics of deserts, desert flora, desert fauna, human adaptation to desert environments, natural resources (etc)

writing about: global deserts, the physical structure and characteristics of deserts, desert flora, desert fauna, human adaptation to desert environments, natural resources (etc)

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

using graphic media devices (cameras and videotape equipment) to collect data

using the Internet to collect data

notetaking

map making

maintaining a portfolio -- evidence of achievement and knowledge/skills development over time.

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts&crafts objects

Create original drawings/paintings

Make visual displays

WEB SITE RESOURCES FOR TEACHERS

www.earthsystems.org	(Earth Systems)
www.secondnature.org	(Second Nature)
www.naturenet.com	(Nature Network)
www.earthwatch.org	(Earth Watch)
www.cnie.org	(National Library for the Environment)
www.epa.gov	(Environmental Protection Agency)
www.disney.go.com	(The Land - Epcot)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: BIOME: DESERTS

STUDENTS CONDUCT BIOLOGICAL STUDY

Take a field trip -- to a desert environment -or- to a sand dune environment to observe types of flora & fauna and to experience climatic conditions (etc). Record data in research logs.

Research desert/desert-like environments and collect data.

Periodically -- revisit the desert environment -or- desert-like environment and observe flora & fauna as well as any/all changes that may have occurred. Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on field trips.

Create visual displays and audiovisual presentations which depict the biome ecosystem.

Interview individuals whose ancestors lived in desert environments -- to learn about human adaptation, food/diet, shelter types, clothing/dress, lifestyles (etc). Record data in research logs and/or on audiotape.

MATERIALS

Community resource site(s), community resource people, graphic media devices, research logs, appropriate dress for field-based activities, encyclopedias, Internet web sites, CD-ROM software (etc).

McClanahan, L. L. "Frogs and Toads in the Desert," ***Scientific American*** March 1994

Parfit, M. "California Desert Lands," ***National Geographic*** May 1996

STUDENTS MONITOR ENVIRONMENTAL DEGRADATION - DUST BOWL

Research America's *DUST BOWL* of the 1930s -- cause(s) and effects. Record data in research logs.

Use atlases/maps to geographically locate the *DUST BOWL* region of the United States. Record data on desktop outline maps.

Take a field trip(s) -- to local/area site(s) to observe evidence of environmental degradation; the gradual transformation of a particular type of biome to that of a desert -or- desert/like ecosystem. Record data in research logs.

Periodically -- revisit the site(s) to determine further evidence of degradation and/or the transformation to a desert -or- desert-like ecosystem. Record data in research logs.

Investigate the cause(s) of the degradation -- meet with community inhabitants, community leaders, business representatives, conservation & environmental group representatives (etc). Record data in research logas and on audio tape.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on field trips.

Create visual displays and audiovisual presentations -- depicting changes that occur in a local/area environment as a result of degradation as well as the cause(s) of that degradation.

MATERIALS

Community resource site(s), community resource people, graphic media devices, research logs, desktop outline maps, atlases & maps, Internet web sites, encyclopedias, CD-ROM software (etc).

Zimmer, C. "How to Make a Desert," ***Discover*** February 1995

ECO-teach Lesson Plan

THEME/TOPIC	BIOME: Mountains
GRADE(S)	Grades 7-12
SUBJECT(S)	Biology, Botany, Geography, Geology
DURATION	Five 50-90 minute classes

DATA

A ***biome*** is a major ***community*** (***flora*** & ***fauna***) located on a specific ***continental sub-division*** of the ***geosphere*** (solid portion of the earth). Biomes are defined by ***combinations*** of ***physiognomy*** -- (***vegetation structure***) and (***environment***). Six major physiognomic ***types*** of ***land communities*** are: ***forest, grassland, woodland, shrub-land, semidesert scrub, desert.***

Mountain environments are ***fragile*** because the ***growing season*** is short. ***Damage*** to plants and trees takes hundreds of years to ***repair***.

The ***timberline*** divides two major ***life zones***: ***alpine tundra*** and ***forest***. Above the timberline only ***herbaceous plants***, ***lickens***, ***mosses***, and ***flattened shrubs*** grow. Within this apline tundra exists ***creatures*** such as ***bighorn sheep*** and ***mountain goats***.

Alpine animals must ***overcome*** the ***lack of oxygen*** and ***carbon dioxide*** caused by the ***low air pressure*** at ***high altitudes***. Mountains get more ***precipitation*** than neighboring ***lowlands*** because the ***moisture*** in the warmer air that rises over mountains ***condenses*** as it rises.

Mountains generally contain several types of ***soil*** from their ***base*** to the ***summit***; ***composed*** of ***mineral particles***, ***plant*** and ***animal material***, water, and air. At high altitudes ***azonal*** soils contain little ***organic matter***. Other soil types include ***fine-to-course textured meadow*** soils, ***moss*** and ***decayed vegetation***-based ***wet*** soils found in ***bogs***, and ***podzols*** -- ***course-textured*** soils found in ***coniferous forests***.

Zones of vegetation are ***classified*** according to ***altitude*** and ***latitude*** -- ***boreal region***, ***austral region***, ***tropical region***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the characteristics of diverse biomes

major physiognomic types of land communities

the fragile nature of mountain environments

mountain environment flora and fauna

mountain environment soil types

zones of vegetation

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

mountain biomes that exist nearby/close to home and distant/far-removed

the fragile nature of mountain biomes that exist nearby/close to home and distant/far-removed

types of flora and fauna found in mountain biomes nearby/close to home and distant/far-removed

types of rocks and soils found in diverse mountain biomes -- nearby/close to home and distant/far-removed zones of mountain biome vegetation

ways by which mountain biomes benefit Man and nurture the local/area natural environment(s).

LESSON OBJECTIVE(S) Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audio-visual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models)

LESSON ACTIVITIES (Each teacher selects options from the following ***learning encounters menu***)

Introduction

Students view an audiovisual presentation that describes the characteristics of mountain biomes that are to be found in differing parts of the world

Students view an audiovisual presentation that describes the fragile nature of mountain environments that are to be found in differing parts of the world

Students view an audiovisual presentation that describes types of mountain environment flora and fauna that are to be found in differing parts of the world

Students view an audiovisual presentation that describes the types of rocks (***igneous, metamorphic, sedimentary***) and soils that are to be found in mountain environments -- in differing parts of the world

Guest speakers discuss: the characteristics of different types of mountain environments -- nearby/close to home and distant/far-removed, the fragile nature of mountain environments -- nearby/close to home and distant/far-removed, types of mountain environment flora and fauna -- nearby/close to home and distant/far-removed, the geology of different types of mountains -- nearby/close to home and distant/far-removed

Students go on field trips to mountain environment sites and observe the flora and fauna, the geology, the overall physical characteristics of the site, types of trees, flowing and standing water (etc)

Students conduct research at selected mountain environment sites

Students bring newspaper/magazine articles to class and discuss: mountains, mountain ranges, mountain environment flora and fauna, forests, the geology of mountains and mountain ranges, mountain environment mineral resources, mountain environment timber resources (etc)

Students watch theme/topic-related ***live*** news events or documentaries on cable television

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: mountain environments, flora and fauna, natural resources, geology, well-known mountains and mountain ranges (etc)

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected mountains and mountain ranges. Data is collected on desktop outline maps

Students collect data on film/videotape while on field trips -or- conducting research at field-based sites in the local/area environment(s)

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: mountains and mountain ranges.

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying the characteristics and physical properties (resources) of mountain environments

Students write essays about their impressions of: the characteristics and physical properties of mountain environments.

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS, CNBC

The DISCOVERY Channel

National Geographic:

"Adirondack High," v193n5, May 1998, p 118-135

"Borneo's White Mountain," v194n3, September 1998 p 118-135

"Mount St. Helens," v194n6, December 1998, p 106-125

"Stone Cold Ascent," v197n2, March 2000, p 96-115

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.americanforests.org	(American Forests)
www.outdoors.org	(Appalachian Mountain Club)
www.globalstewards.org	(Global Stewards)
www.wildrockies.org	(Wild Rockies)
www.nrd.org	(Natural Resources Defense Council)
www.csf.colorado.edu/consbio	(Conservation Biology)
www.trailsandgreenways.org	(Trails and Greenways)
www.defenders.org	(Defenders of Wildlife)
www.doi.gov	(U.S. Department of the Interior)
www.blm.gov	(Bureau of Land Management)
www.fs.fed.us	(USDA Forest Service)
www.usgs.gov	(U.S. Geological Survey)
www.globalforestwatch.org	(Global Forest Watch)
www.australianalps.environment.gov.au	(The Australian Alps)

www.npca.org	(National Parks Conservation Association)
www.epa.gov	(Environmental Protection Agency)
www.wri.org/forests	(World Resources Institute)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about: the fragile nature of mountain environments, mountain environment flora and fauna, mountain environment soil types, the geology of different mountains/mountain ranges, mountain environment natural resources

talking about: the fragile nature of mountain environments, mountain environment flora and fauna, mountain environment soil types, the geology of different mountains/mountain ranges, mountain environment natural resources

writing about: the fragile nature of mountain environments, mountain environment flora and fauna, mountain environment soil types, the geology of different mountains/mountain ranges, mountain environment natural resources

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

maintaining a portfolio -- evidence of achievement and knowledge/skills development over time.

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts&crafts objects

Create original drawings/paintings

Make visual displays

WEB SITE RESOURCES FOR TEACHERS

www.nationalgeographic.com/maps (National Geographic Society)

www.eb.com (Explore Britannica)

www.secondnature.org (Second Nature)

www.sierraclub.org (Sierra Club)

www.aeoe.org (Association for Environmental & Outdoor Education)

www.wyoming.com/`ygt (Yellowstone Grizzly Foundation)

www.geologylink.com (Geology Link)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: BIOME: MOUNTAINS

STUDENTS EXPLORE A MOUNTAIN ECOSYSTEM

Meeting(s) with community resource people -- conservation officer(s), forest service officer(s), environmental group representative(s), mountain climbing club member(s) (etc) to identify a potential hiking/ camping area. Record data in research logs.

Use maps to geographically locate the potential hiking/camping area. Record data on desktop outline maps.

Take a weekend hiking/camping trip -- to observe and interact with the mountain environment, to learn & apply hiking and camping skills, to cooperate with fellows, to learn about flora and fauna species, to observe the pristine nature of the mountain environment (etc). Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the hiking/ camping trip.

Create visual displays and audiovisual presentations.

MATERIALS

Community resource site, community resource people, backpacks, compasses, canteens, sleeping bags, tents, ruck sacks, hiking boots, appropriate dress, graphic media devices, research logs, atlases & maps, desktop outline maps, dictionaries, encyclopedias, Internet web sites, CD-ROM software (etc).

Acharya, A. "Plundering the Boreal Forests," ***WorldWatch*** v8n3, May - June 1995

Sugal, C. "Labeling Wood: How Timber Certification May Reduce Deforestation," ***WorldWatch*** v9n5 September - October 1996

STUDENTS CREATE A MOUNTAIN ECOSYSTEM TERRARIUM

Research -- the characteristics and composition of a typical mountain environment (below the timberline). Record data in research logs.

Take a field trip(s) -- to a mountain environment to observe the characteristics and composition of the area, to listen for a variety of sounds, to identify types of rocks and mineral deposits, to study soil types, to observe species of flora and fauna (etc). Record data in research logs.

Use maps to geographically locate the mountain site. Record data on desktop outline maps.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Make a mountain ecosystem terrarium.

Observe any/all changes that may occur in the terrarium -- over time. Record data in research logs.

Periodically -- revisit the mountain ecosystem site and compare changes that occur in the terrarium with similar changes that occur/are evident at the natural site. Also note changes that occur in the terrarium but are not evident at the natural site. Record data in research logs.

BEFORE-DURING-AFTER terrarium construction photographs -- presented as a visual display.

Create visual displays and audiovisual presentations.

MATERIALS

Fish tank -or- large glass fish bowl, pane of glass (terrarium cover), plants-algae-snails (etc), soil, pebbles & stones, tree bark, moss, gloves, garden tools, safety glasses, graphic media devices, Internet web sites, dictionaries, encyclopedias, CD-ROM software, research logs (etc).

ECO-teach Lesson Plan

THEME/TOPIC	BIOME: Rainforests
GRADE(S)	Grades 7-12
SUBJECT(S)	Biology, Botany, Earth Science, Geography
DURATION	Five 50-90 minute classes

DATA

A ***biome*** is a major ***community*** (***flora***) (***fauna***) located on a specific ***continental sub-division*** of the ***geosphere*** (solid portion of the earth). Biomes are defined by ***combinations*** of ***physiognomy*** (***vegetation structure***) and ***environment***. Six major physiognomic types of ***land communities*** are: ***forest, grassland, woodland, shrub-land, semidesert scrub, desert.***

Rainforests exist in Central America, South Africa, Central-West Africa, East Australia, the Philippines, Malaysia, Indonesia, Borneo, New Zealand, India, Haiti, the VietNam - Cambodia - Laos region, and in the Pacific Northwest of the United States.

There are as many as 30-40 different ***types*** of rainforests (e.g., ***evergreen lowland forest, evergreen mountain forest, tropical evergreen alluvial forest***). The ***defining characteristics*** of tropical rainforests are ***temperature*** and ***rainfall.*** The ***main canopy*** of the forest is formed by the ***crowns*** of the ***middle strata*** of trees -- 100 to 130 feet high. The ***forest floor*** is often bare. Many ***rainforest plants*** can ***tolerate*** low sunlight and some even ***prefer*** deep shade.

Climbers and ***epiphytes*** are plants that ***occur*** at all levels of the forest. ***Orchids*** are among the ***most common*** epiphytes in tropical rainforests. Other plants include: ***bromeliads, ferns, lianas*** or ***vines***. Each ***layer*** of the rainforest is a ***distinct habitat*** -- the ***floor,***

the ***understory,*** the ***canopy,*** and the ***giant emergent trees***.

More animals live in the canopy than in any other part of the rainforest. Most canopy animals are ***herbivorous***. Many ***animals*** and ***insects*** have ***shapes*** and ***colors*** that are ***effective camouflage*** (e.g., ***praying mantis, leaf-toads***). ***Tree-dwellers*** include: ***toucans, hornbills, parakeets, howler monkeys, spider monkeys, chimpanzees, sloths, squirrels, rats, mice, snakes, frogs, lizards.*** Insects make their ***nests*** in every conceivable part of the forest.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the characteristics of diverse biomes

major physiognomic types of land communities

the physical characteristics of rainforests

different types of rainforests

the different types of flora and fauna that exist in rainforest ecosystems.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the characteristics of local/area forests that resemble those of rainforests

flora and fauna to be found in local/area forests that resemble those to be found in rainforests the importance of rainforests to the production of oxygen for the global atmosphere

the importance of rainforests as a habitat for exotic species of flora and fauna

the plight of global rainforests and Man's efforts to save them from destruction -- and to save flora and fauna from extinction.

LESSON OBJECTIVE(S) Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audio-visual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models)

LESSON ACTIVITIES (Each teacher selects options from the following ***learning encounters menu***)

Introduction

Students view an audiovisual presentation that describes the characteristics of different types of rainforests

Students view an audiovisual presentation that describes the physical structure (layers) of rainforests

Students view an audiovisual presentation that describes the various types of rainforest flora and fauna

Guest speakers discuss: the importance of rainforests to Earth's global ecosystem, different types of rainforests, the geographical location of rainforests, rainforest flora and fauna, Man's wanton destruction of rainforests, the extinction of rainforest flora and fauna, Man's efforts to save rainforests -- habitats & species

Students go on field trips to rainforest areas (if available) OR visit an aviary -- in order to gain a vicarious rainforest experience OR visit a museum of natural history -- to observe the physical characteristics of a rainforest OR visit a zoo and observe animal species that live in rainforests

Students conduct research in rainforests OR conduct research in an aviary, a museum of natural history, or a zoo

Students bring newspaper/magazine articles to class and discuss: the geographical location of rainforests, rainforest flora and fauna, the destruction of rainforest environments, the extinction of rainforest species, Man's efforts to save rainforest habitats & species

Students watch theme/topic-related ***live*** news events or documentaries on cable television.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: the geographical location of rainforests, types of rainforests, rainforest flora and fauna, the destruction of rainforests, the extinction of rainforest species, Man's efforts to save rainforest habitats & species, the critical importance of rainforests to a healthy Earth's atmosphere (etc)

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes (etc) to locate rainforests. Data is collected on desktop outline maps

Students collect data on film/videotape while on field trips -or- conducting research at selected field-based sites (aviaries, museums, zoos)

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: the geographical location of rainforests -- worldwide.

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying the location, physical structure, characteristics of global rainforests; investigating rainforest flora and fauna; the destruction of rainforests; the extinction of rainforest flora and fauna (etc)

Students write essays about their impressions of: rainforest environments, rainforest flora and fauna, the destruction of rainforest habitats & species (etc)

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **Nature** on PBS

Episodes of **National Geographic EXPLORER** on TBS, CNBC

The DISCOVERY Channel

National Geographic:

special issue: **Making Sense of the Millennium**
v193n1 January 1998

"Planet of the Beetles," v193n3, March 1998, p 100-119

"The Elusive Quetzal," v193n6, June 1998, p 34-45

"Zanzibar's Endangered Red Colobus Monkeys,"
v194n5, November 1998, p 72-81

"Tracking the Anaconda," v195n1, January 1999
p 62-69

"Forest Elephants," v195n2, February 1999, p 100-113

"Central America's Orphan Gorillas," v197n2, February
2000, p 84-97

"Madidi," v197n3, March 2000, p 2-21

"Ants & Plants," v197n5, May 2000, p 84-97

"Suriname," v197n6, June 2000, p 38-55

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.rainforest-alliance.org	(Rainforest Alliance)
www.ran.org/ran	(Rainforest Action Network)
www.worldwildlife.org/amazon	(Saving the Amazon Rainforest)
www.tongass.com	(Tongass Clearinghouse: America's North Pacific Rainforest)
www.foe.org	(Friends of the Earth)
www.wcmc.org.uk	(World Conservation Monitoring Centre)

www.globalstewards.org	(Global Stewards)
www.conbio.rice.edu/v1	(The Virtual Library of Ecology and Biodiversity)
www.earthsystems.org	(Earth Systems)
www.greenpeace.org	(Greenpeace)
www.earthwatch.org	(Earth Watch)
www.globalforestwatch.org	(Global Forest Watch)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about: global rainforests, rainforest flora and fauna, the destruction of rainforests, Man's efforts to save rainforest habitats & species (etc)

talking about: global rainforests, rainforest flora and fauna, the destruction of rainforests, Man's efforts to save rainforest habitats & species (etc)

writing about: global rainforests, rainforest flora and fauna, the destruction of rainforests, Man's efforts to save rainforest habitats & species (etc)

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and videotape equipment) to collect data

using the Internet to collect data

notetaking

map making

maintaining a portfolio -- evidence of achievement
and knowledge/skills development over time

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts&crafts objects

Create original drawings/paintings

Make visual displays

WEB SITE RESOURCES FOR TEACHERS

www.coastalrainforest.org (Coastal Rainforest Coalition)

www.nationalgeographic.com/maps (National Geographic Society)

www.enn.com (Environmental News Network)

www.conservationfund.org (Conservation Fund)

www.eb.com (Explore Britannica)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: BIOME: RAINFORESTS

STUDENTS TALK ABOUT RAINFORESTS

Research -- types and locations of global rainforests. Record data in research logs.

Use atlases & maps to geographically locate selected rainforests. Record data on desktop outline maps.

Read about rainforest-related news events/stories and collect articles for discussion & display. Record data in research logs.

Talk with individuals (via the Internet) who have lived in - traveled to - worked in rainforest environments. Record data in research logs.

Take a field trip(s) -- to a regional rainforest environment (if available) and/or to a museum of natural history, to a zoo, to an aviary (etc) to interact with a recreated (man-made) rainforest environment (flora & fauna) (physical structure and composition). Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Create visual displays which depict the physical structure/composition of different types of rainforests. Identify the similarities/difference among the several types -- visually locate each rainforest on a world map.

MATERIALS

Community resource site(s), community resource people, global resource people, World Wide Web, graphic media devices, research logs, dictionaries, encyclopedias, CD-ROM software, Internet web sites, magazines & newspapers, atlases & maps (etc).

Goulding, M. "Flooded Forests of the Amazon," ***Scientific American*** March 1993

Moffett, M. "These Plants Claw and Strangle Their Way to the Top," ***Smithsonian*** September 1993

STUDENTS MAKE A RAINFOREST ECOSYSTEM TERRARIUM

Research -- types and locations of global rainforests. Focus on the characteristics and composition (e.g., flora, fauna, amphibians, reptiles, insects, arachnids, soil types, fungi) of various types of rainforests. Record data in research logs.

Take a field trip(s) -- to a regional rainforest (if available) and/or to a museum of natural history, to a zoo, to an aviary (etc) to interact with a recreated (man-made) rainforest environment (flora & fauna) (physical structure and composition). Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Use atlases & maps to geographically locate selected global rainforests. Record data on desktop outline maps.

Make a rainforest ecosystem terrarium.

Observe any/all changes that may occur in the terrarium -- over time. Record data in research logs and on film/videotape.

Create visual displays and audiovisual presentations.

MATERIALS

Fish tank(s), pane(s) of glass (terrarium cover), green plants, vines, alage, snails-slugs- spiders (etc), moss, dirt or soil, flowering plants, tree bark, seedlings, toads-frogs-snakes-lizards (etc), graphic media devices, research logs, atlases & maps, desktop outline maps, Internet web sites, CD-ROM software, dictionaries, encyclopedias, community resource site(s), community resource people (etc).

Goulding, M. "Flooded Forests of the Amazon," ***Scientific American*** March 1993

Moffett, M. "These Plants Claw and Strangle Their Way to the Top," ***Smithsonian*** September 1993

ECO-teach Lesson Plan

THEME/TOPIC	BIOME: Wetlands
GRADE(S)	Grades 7-12
SUBJECT(S)	Biology, Botany, Earth Science, Geography
DURATION	Five 50-90 minute classes

DATA

A ***biome*** is a major ***community*** (***flora***) (***fauna***) located on a specific ***continental sub-division*** of the ***geosphere*** (solid portion of the earth). Biomes are defined by ***combinations*** of ***physiognomy*** (***vegetation structure***) and ***environment***. Six major physiognomic types of ***land communities*** are: ***forest, grassland, woodland, shrub-land, semidesert scrub, desert.***

Wetlands (***bogs, marshes, swamps***) are ***areas*** which, either ***permanently*** or ***seasonally***, are wet and support ***specially-adapted vegetation*** and animal life.

Wetlands ***provide flood protection, recharge ground water, transform toxics and pollution*** as water passes through them, ***protect stream banks and shorelines from erosion, provide food - spawning - nursery areas*** for many commercial fish and ***shellfish***.

Plants that grow in wetlands have ***adapted*** to ***anaerobic soil*** conditions. These ***hydrophytes*** (water plants) usually have ***shallow root systems*** which take advantage of the ***thin layer*** of ***oxygenated soil***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the characteristics of diverse biomes

major physiogonomic types of land communities

the physical characteristics of wetlands

different types of wetlands

the several ways by which wetlands protect the overall ecosystem(s) of areas in which they are located

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

different types of wetlands that exist nearby/close to home and distant/far-removed

the several ways by which wetlands protect the overall ecosystem(s) of areas that are nearby/ close to home and distant/far-removed

the types of commercial industries that depend upon wetlands resources for their financial well-being -- nearby/close to home and distant/ far-removed.

LESSON OBJECTIVE(S)

Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audio-visual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models).

LESSON ACTIVITIES (Each teacher selects options from the following ***learning encounters menu***)

Introduction

Students view an audiovisual presentation that describes different types of wetlands that exist nearby/close to home and distant/far-removed

Students view an audiovisual presentation that explains several ways by which wetlands protect the overall ecosystem(s) of areas that are nearby/close to home and distant/far-removed

Students view an audiovisual presentation that describes ways by which commercial industries are dependent upon wetlands resources for their financial well-being -- nearby/close to home and distant/far-removed

Guest speakers discuss: different types of wetlands found in the local/area environment(s), ways by which wetlands protect overall ecosystems, the commercial value of wetlands

Students go on field trips to wetlands and observe the overall physical structure and characteristics of these areas (bogs, marshes and/or swamps) -- including soil types, flora, fauna

Students conduct research in selected wetlands

Students bring newspaper/magazine articles to class and discuss: Man's pollution of wetlands, Man's destruction of wetlands -- in order to use the land for building purposes, Man's attempts to save endangered wetlands (Everglades, salt marshes along the Atlantic Coast, clam and oyster beds), the importance of wetlands in the overall ***ecological web*** of lifespace environments (etc)

Students watch theme/topic-related ***live*** news events or documentaries on cable television.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: the plight of wetlands -- nearby/ close to home and distant/far-removed, the flora and fauna found in wetlands, the importance of wetlands to the overall ecosystem(s) of areas in which they exist, the dependence of certain commercial industries upon wetlands resources, the importance of wetlands to fishermen and hunters, the aesthetic value of wetlands (etc)

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate wetlands areas. Data is recorded on desktop outline maps

Students collect data on film/videotape while on field trips -or- conducting research at selected field-based sites in the local/area environment(s)

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: the location of selected bogs, marshes, swamps -- nearby/close to home and distant/ far-removed.

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying the characteristics and physical structure of wetlands, flora and fauna found in wetlands, Man's destruction of wetlands, wetlands conservation efforts (etc)

Students write essays about their impressions of: wetlands, Man's wanton destruction of wetlands, Man's efforts to save wetlands -- and to restore them to their natural condition (etc).

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS, CNBC

Episodes of **Nature** on PBS

The DISCOVERY Channel

National Geographic:

special issue: **Making Sense of the Millennium**
v193n1 January 1998

"Vernal Pools," v195n4, April 1999, p 122-135

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books

INTERNET

www.wetlands.ca	(The Wetlands Network)
www.nwi.fws.gov	(National Wetlands Inventory)
www.malloryswamp.org	(Rewilding Mallory Swamp)
www.nrdc.org/water/everglades	(Natural Resources Defense Council)
www.nationalgeographic.com/maps	(National Geographic Society)
www.eb.com	(Explore Britannica)
www.epa.gov	(Environmental Protection Agency)
www.audubon.org	(Audubon Society)
www.tnc.org	(The Nature Conservancy)
www.americanbirding.org	(American Birding)
www.naturenet.com	(Nature Network)
www.secondnature.org	(Second Nature)
www.conservation.org	(Conservation International)
www.greatswamp.org	(Great Swamp Watershed Association)
www.epa.gov/owow/estuaries	(Environmental Protection Agency)

ASSESSMENT

Students demonstrate acquired knowledge and skills development by:

reading about: types of wetlands, Man's wanton destruction of wetlands, Man's efforts to save and restore wetlands, the importance of wetlands

in the ***ecological web*** of diverse ecosystems,
the commercial value of wetlands (etc)

talking about: types of wetlands, Man's wanton destruction of wetlands, Man's efforts to save and restore wetlands, the importance of wetlands in the ***ecological web*** of diverse ecosystems, the commercial value of wetlands (etc)

writing about: types of wetlands, Man's wanton destruction of wetlands, Man's efforts to save and restore wetlands, the importance of wetlands in the ***ecological web*** of diverse ecosystems, the commercial value of wetlands (etc)

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and videotape equipment) to collect data

using the Internet to collect data

notetaking

map making

maintaining a portfolio -- evidence of achievement and knowledge/skills development over time.

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts&crafts objects

Create original drawings/paintings

Make visual displays

WEB SITE RESOURCES FOR TEACHERS

www.ericse.org	(ERIC Clearinghouse for Science, Mathematics and Environmental Education)
www.nceet.snre.umich.edu	(EE - Link)
www.nwf.org	(National Wildlife Federation)
www.envirolink.org	(EnviroLink)
www.enn.com	(Environmental News Network)
www.emagazine.com	(E magazine)

www.cnie.org (National Library for the Environment)

www.earthwatch.org (Earth Watch)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: BIOME: WETLANDS

STUDENTS ADOPT A WETLANDS AREA

Research -- *wetlands, bogs, marshes, swamps, estuaries* (etc). Record data in research logs.

Research -- the plight of wetlands that can be found nearby/close to home and distant/far-removed. Record data in research logs.

Use atlases & maps to geographically locate selected wetlands that can be found nearby/close to home and distant/far-removed. Record data on desktop outline maps.

Meeting(s) with conservation officer(s), environmental group representative(s), pollution control officer(s), wetlands area property owners, Audubon Society representative(s), The Nature Conservancy representative(s), land developers (etc) -- to understand 1) the plight of wetlands, 2) Man's intrusion into wetlands, 3) the draining & conversion of wetlands into usable/developed land, 4) the importance of wetlands as migratory bird sanctuaries (etc). Record data in research logs and on audiotape.

Take a field trip(s) -- to wetlands area(s) to observe the overall environment, to observe - in particular - the flora & fauna, to learn about the plight of wetlands, to learn about the ways that wetlands are critically important to the overall ecosystem of the area/region, to learn about the value of wetlands as bird sanctuaries (etc). Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Periodically -- revisit the wetlands site(s) to observe any/all changes that may have occurred. Record data in research logs, on film/videotape and audiotape.

Create visual displays and audiovisual presentations.

MATERIALS

Community resource site(s), community resource people, graphic media devices, research logs, atlases & maps, desktop outline maps, Internet web sites, CD-ROM software, dictionaries, encyclopedias (etc).

Kusler, J. A. "Wetlands," ***Scientific American*** January 1994

STUDENT INTERNS

Meeting(s) with conservation officer(s), environmental group representative(s), pollution control officer(s), wetlands area property owners, Audubon Society representative(s), The Nature Conservancy representative(s) (etc) -- to understand 1) the plight of wetlands, 2) Man's intrusion into wetlands, 3) the importance of wetlands to the local/area environment, 4) types of flora & fauna to be found in wetlands (etc). Record data in research logs and on audiotape.

Research -- the characteristics and composition of wetlands (bogs, marshes, swamps). Record data in research logs.

Use atlases & maps to geographically locate selected wetlands that can be found nearby/close to home and distant/far-removed. Record data on desktop outline maps.

Volunteers -- assist local/county/state wetlands conservation officer(s) in the maintenance/protection of local/area bogs, marshes and/or swamps. Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while at the wetlands site(s).

Create visual displays and audiovisual presentations.

MATERIALS

Community resource site(s), community resource people, graphic media devices, research logs, atlases & maps, desktop outline maps, Internet web sites, CD-ROM software, newspapers & magazines, books, dictionaries, encyclopedias (etc).

Mairson, A. "The Everglades: Dying for Help," ***National Geographic*** April 1994

Rutzler, K. "Caribbean Mangrove Swamps," ***Scientific American*** March 1996

ECO-teach Lesson Plan

THEME/TOPIC	Environmental Engineering
GRADE(S)	Grades 7-12
SUBJECT(S)	Anthropology, Architecture, Biology, Earth Science, Geography, Geology, History, Physics, Sociology
DURATION	Five to Ten 50-90 minute classes

DATA

Using modern ***technology***, Man is capable of influençing and ***transforming*** the ***natural environment*** -- in order to ***accommodate*** his ***vision*** of the ***ideal lifespace***. Man ***creates sheltered environments*** within which he ***controls*** local ***conditions***.

As humans take more of the ***primary productivity*** of the earth for themselves they leave less for other ***life forms***. Throughout ***history*** there has been a ***struggle*** between ***built*** environments and ***biological*** environments for a share of the ***physical*** environment.

The human ***imprint*** on the earth's ***landscapes*** and ***processes*** is ***profound*** and ***pervasive***. ***Using the environment*** means ***modifying*** it. ***Landscape modifications*** are not ***natural*** but ***cultural -- shaped and formed*** as ***societies*** have ***occupied*** and ***used*** the ***surface*** (**crust**) of the earth.

Land degradation may be defined as the loss of ***utility*** or ***potential utility*** or the ***reduction,*** loss or change of ***features*** or ***organisms*** which cannot be ***replaced***. Land degradation is often seen as a ***consequence*** or ***side effect*** of ***development***.

Man is now in the process of ***creating*** an ***artificial*** physical environment for his own ***society*** of men. Developing the ***technique*** and process of ***genetic engineering*** -- Man is capable of ***creating life*** in a ***test tube*** or ***altering*** the ***genetic structure*** of plants to create new ***strains*** of ***crops.***

Man must remember that he and nature are ***inextricably linked.*** Man cannot ***survive*** on earth without a ***healthy*** natural environment.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

Man's ability to alter/change aspects of nature's global environment -- using advanced technology

the characteristics of ***built*** environments -- those that enhance and detract from a *quality lifespace*

reasons why Man desires to alter/change aspects of nature's global environment.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

examples of environmental engineering to be found in the loca/area environment(s)

the characteristics of ***built*** environments found nearby/close to home and distant/far-removed

ways in which environmental engineering have benefited Man and Nature -- nearby/close to home and distant/far-removed

efforts made by Man to correct the plight of Nature (or to reverse the negative impact) caused by environmental engineering -- nearby/close to home and distant/far-removed reasons why Man has felt the need to alter/change nature's global environment -- nearby/close to home and distant/far-removed.

LESSON OBJECTIVE(S) Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audiovisual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, posters, models, historic artifacts).

LESSON ACTIVITIES (Each teacher will select from the following options)

Introduction

Students view an audiovisual presentation dealing with the diverse characteristics of selected ***built*** environments -- architecture, land use planning and zoning, landscape modifications, commons (etc)

Students view an audiovisual presentation that discusses ways in which environmental engineering have benefited Man and Nature

Students view an audiovisual presentation that describes Man's efforts to correct the plight of Nature -or- to reverse the negative impact (upon Nature) caused by environmental engineering

Guest speakers discuss: ***built*** environments, effects of environmental engineering, Man's efforts to improve the quality of nature's global environment

Students go on field trips into local/area communities and observe the physical characteristics of ***built*** environments as well as understand examples of environmental engineering that have either a positive or negative effect upon Nature

Students conduct research studies in selected ***built*** environments

Students bring newspaper/magazine articles to class and discuss: environmental engineering -- its effects upon both natural and ***built*** environments

Students watch theme/topic-related ***live*** news events or documentaries on cable television.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: environmental engineering -- reasons and consequences

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected ***built*** environments (e.g., cities, towns, villages, recreational areas, colonies). Data is recorded on desktop outline maps

Working in small research groups, students use ***Globescope matrices*** to record and display data related to the characteristics of selected natural environments AND to the traits of selected cultures

Students collect data on film/videotape while on field trips -or- conducting research at field-based (***built*** environment) sites

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: selected examples of environmental engineering

The teacher uses historic artifacts, timelines, CD-ROM software (etc) to teach a lesson about: human cultural development during selected periods of history -- and the effects of this development upon Nature's biological and physical environments.

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying environmental engineering and its positive/negative effects upon Man & Nature

Students write essays about their impressions of Man's environmental engineering efforts throughout history

MATERIALS/RESOURCES

Episodes of **National Geographic EXPLORER** on TBS

The DISCOVERY Channel

National Geographic:

special issue: **Global Culture** v196n2, August 1999

special issue: **Making Sense of the Millennium**
v193n1, January 1998

map insert: "Millennium in Maps- Cultures"
v193n1, January 1998

"Survey 2000," v196n6, December 1999, p 130-133

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

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INTERNET

www.art.man.ac.uk (Centre for Urban and Regional Ecology)

www.communities-by-choice.org (Communities by Choice)

www.trailsandgreenways.org (Trails and Greenways)

www.planning.org (American Planning Association)

www.townscape-inst.com/index.html (The Townscape Institute)

www.uli.org (Urban Land Institute)

www.secondnature.org (Second Nature)

www.earthvision.net (Earth Vision Network)

www.phe.rockefeller.edu (The Program for the Human Environment)

www.earthwatch.org (Earth Watch)

www.nationalgeographic.com (National Geographic Society)

www.reddawn.com (Residential Environmental Design and Architecture)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about environmental engineering -- reasons and effects

talking about environmental engineering -- reasons and effects writing about environmental engineering -- reasons and effects

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making.

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts & crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

- www.askeric.org (AskERIC)
- www.cnie.org (National Library for the Environment)
- www.secondnature.org (Second Nature)
- www.environmentaldirectory.net (Environmental Directory)
- www.doi.gov (U.S. Department of the Interior)
- www.greendesign.net (Green Design Network)
- www.dir.yahoo.com/society_and_culture/Environment_and_Nature
- www.cde.unibe.ch/index.html (Centre for Development and Environment)
- www.greenkeepers.com (Greenkeepers)
- www.hgtv.com (Home&Garden Television)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: ENVIRONMENTAL ENGINEERING

STUDENTS DOCUMENT SITE DEVELOPMENT PROCESS

A parcel of land scheduled for development is identified.

Take periodic field trips -- to observe various stages of the land development process at the selected site. Data is recorded in research logs.

BEFORE-DURING-AFTER land development process photographs -- presented as a visual display.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while at the land development site.

Observe ways in which the natural properties on/around the developed site are altered -- data is recorded in research logs.

MATERIALS

Parcel of land, community resource people, graphic media devices, research logs, maps (etc).

Holloway, M. "Managing Planet Earth," ***Scientific American*** September 1989

STUDENTS DESIGN A 'MODEL' COMMUNITY FOR 21ST CENTURY LIVING

Take field trips -- to observe the architecture, zoning patterns, commons, highways and transportation facilities (etc) found in local/area urban-suburban-rural communities. Data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while at various

built environment sites.

Select a type of community (urban, suburban, rural) and design a 'model' community layout using graph paper.

Construct model buildings/homes (etc) and affix to the surface of a painted/ landscaped sheet of plywood.

BEFORE-DURING-AFTER 'model' community development photographs -- presented as a visual display.

MATERIALS

Sheet(s) of plywood, paint, crushed stone-gravel, plastic trees, model automobiles, balsa wood or oak tag constructed buildings/homes, paper mache' (newspaper strips, flour, water), mixing bowls, molding clay, construction paper (etc).

Ezcurra, E. "Are Mega - Cities Viable?" ***Environment*** v38n1 January - February 1996

ECO-teach Lesson Plan

THEME/TOPIC	Pollution
GRADE(S)	Grades 7-12
SUBJECT(S)	Biology, Botany, Chemistry, Earth Science, History, Sociology
DURATION	Five 50-90 minute classes

DATA

The most *unsettling discovery* ,is how little is actually known about what we are doing to the Earth.

With so many ***untested*** and unknown ***substances*** being ***dumped*** into the ***environment***, with such ***massive engineering changes*** underway, and so much ***biological dislocation*** taking place, it is inevitable that more ***unpleasant*** surprises await us.

MAN added a whole new ***dimension*** to ***environmental pollution*** when he started burning ***fossil fuels*** for ***energy***. We have continued to ***dispose*** of our ***wastes*** -- largely by ***dumping*** them into the ***atmosphere*** and ***hydrosphere***; ***smog*** and the automobile, ***sulfur*** pollution, ***oil*** in the ***ecosystem***, ***thermal*** pollution, ***pesticides***, ***PCBs***, ***fertilizers***, ***solid waste***, and ***sewage***, ***radioactive*** and ***chemical materials***.

Waste materials may become ***highly visible*** while others are ***colorless***, ***odorless***, and ***invisible*** to the eye. Wastes can be ***highly mobile*** and ***commute indiscriminately*** between land, air, and water. The ***lifetime*** of some wastes may be ***measured*** in years or ***decades***. Wastes may be ***labeled*** *soft* or *hard* by virtue of their ***longevity*** or ***degradability*** in the environment.

MAN, with his ***technology*** of ***power production***, ***industry***, ***transportation*** (etc) far outdoes Nature as a ***polluter***. ***Chemical contamination*** and ***litter*** can be observed from the ***poles*** to the ***tropics*** and from beaches to the oceans' depths.

The problems of pollution, in an ***ecological sense***, are the ***accumulation*** of the ***by-products*** of Man's activities and behavior. As a result, government has attempted, on the federal and state/local levels, to curb wanton pollution with the passage of environment protection legislation such as the ***Clean Air Act***, the ***Clean Water Act***, and the ***Water Pollution Control Act***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

Man's efforts to curb environmental pollution

the need to protect the atmosphere and hydrosphere

the need to manage Man's use of technology (devices) processes that cause and/or contribute to environmental pollution

legislation such as the Clean Air Act, the Clean Water Act, thw Water Pollution Control Act

the enforcement of federal and state/local pollution control laws by the EPA (Environmental Protection Agency) and other agencies

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the enactment of pollution abatement legislation (laws) to protect MAN & NATURE -- nearby/close to home and distant/far-removed

the enforcement of pollution abatement laws to protect the atmosphere and hydrosphere -- nearby/close to home and distant/far-removed efforts to control/monitor the use of technology and processes that have the potential to pollute Earth's environment -- nearby/close to home and distant/far-removed

LESSON OBJECTIVE(S) Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audiovisual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models)

create/make contributions to a course-related portfolio.

LESSON ACTIVITIES (Each teacher selects from the following options)

Introduction

Students view an audiovisual presentation that chronicles the enactment of pollution abatement laws -- nearby/close to home and distant/far-removed

Students view an audiovisual presentation that details the efforts of various federal, state and/or local agencies to enforce pollution abatement laws -- nearby/close to home and distant/far-removed

Students view an audiovisual presentation that identifies Man's inventions/technologies and industry/production-related processes that have contributed significantly to the pollution of Earth's atmosphere and hydrosphere -- nearby/close to home and distant/far-removed

Guest speakers discuss: the causes-and-effects of air & water pollution, pollution abatement laws/policies, the enforcement of pollution abatement laws/policies

Students go on field trips to natural and ***built*** environment sites to observe evidence of air and/or water pollution, technologies and/or processes that contribute to air and/or water pollution, efforts to reduce or eliminate future air and/or water pollution

Students conduct research at local/area natural and ***built*** environment(s)

Students bring newspaper/magazine articles to class and discuss: the causes-and-effects of air & water pollution, pollution abatement laws/policies, the enforcement of pollution abatement laws/policies

Students watch theme/topic-related ***live*** news events and documentaries on cable television

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: the causes-and-effects of air & water pollution, pollution abatement laws/policies, the enforcement of pollution abatement laws/policies

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate pollution sites, sites where pollution abatement laws/policies have been enforced/are currently being enforced. Data is recorded on desktop outline maps

Students collect data on film/videotape while on field trips -or- conducting research at field-based sites in local/area natural and ***built*** environments

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: the causes of- and the location of air & water pollution, pollution abatement law/policies enforcement, ways by which the pollution of air & water in a particular geographical location affects the quality of the air & water in other/distant geographical locations

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying the causes-and-effects of air & water pollution -- nearby/close to home and distant/far-removed, pollution abatement laws/policies -- nearby/close to home and distant/far-removed, pollution abatement laws/policies enforcement -- nearby/close to home and distant/far-removed

Students write essays about their impressions of the causes-and-effects of air & water pollution, efforts made to reduce and/or eliminate air & water pollution in the 21st century

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS

Episodes of **Nature** on PBS

Jacques Cousteau Specials (television syndication)

National Geographic:

"Coral in Peril," v195n1, January 1999, p 31-37

"The Rise and Fall of the Caspian Sea," v195n5, May 1999, p 2-35

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books

INTERNET

www.epa.gov (Environmental Protection Agency)

www.webdirectory.com (Amazing Environmental Organization Web Directory)

www.wef.org (Water Environment Federation)

www.nonoise.org (Noise Pollution Clearinghouse)

www.engg.ksu.edu/HSRC (Great Plains/Rocky Mountain Hazardous Substance Research Center)

www.nwair.org (Northwest Air Pollution Authority)

www.epa.gov/docs/acidrain (Environmental Protection Agency)

www.unep.ch (United Nations Environment Programme)

www.greencar.policy.net (Green Car)

www.qlink.queensu.ca/~4lrm4/table.htm (Acid Rain)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about: the causes-and-effects of air & water pollution, pollution abatement laws/policies, enforcement of pollution abatement laws/policies

talking about: the causes-and-effects of air & water pollution, pollution abatement laws/policies, enforcement of pollution abatement laws/policies

writing about: the causes-and-effects of air & water pollution, pollution abatement laws/policies, enforcement of pollution abatement laws/policies

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape recorders) to collect data

using the Internet to collect data

notetaking

map making

maintaining a portfolio -- evidence of achievement and knowledge/skills development over time

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts&crafts objects

Create original drawings/paintings

Make visual displays

WEB SITE RESOURCES FOR TEACHERS

www.askeric.org	(AskERIC)
www.secondnature.org	(Second Nature)
www.mcb.co.uk/confhome.htm	(Conference on Contaminated Land)
www.discovery.com	(The DISCOVERY Channel)
www.enn.com	(Environmental News Network)
www.soton.ac.uk/`engenvir	(Environmental Database for Use in Schools)
www.neosoft.com/`ghasp	(Galveston-Houston Association for SMOG Prevention)
www.awma.org	(Air & Waste Management Association)
www.deq.state.or.us/wmc/civic.html	(Commercial Waste Reduction Clearinghouse)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: POLLUTION

STUDENTS MONITOR AIR QUALITY

Accompany air quality control officer(s) -- observe ways by which types and amounts of various pollutants in the atmosphere are measured and documented. Data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment) to document the monitoring process(es).

Take a field trip -- to observe commercial production processes in local/area factories and mills, to observe pollution control devices/processes used to eliminate or dramatically reduce emissions into the atmosphere. Data is recorded in research logs.

MATERIALS

Air quality control officer's equipment, research logs, motion picture/ still photography cameras and videotape equipment, audiotape recorders, community resource sites (etc)

Adler, T. "The Expiration of Respiration," *Science News* v149 February 1996

Hedin, L. O. "Atmospheric Dust and Acid Rain," *Scientific American* December 1996

STUDENTS MONITOR WATER QUALITY

Accompany water quality control officer(s) -- observe ways by which types and amounts of pollutants in ground water OR in surface water supplies (e.g., brooks, streams, rivers, ponds, lakes) are measured and documented. Data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment) to document the monitoring process(es).

Take a field trip -- to observe water treatment processes at a local/area plant. Data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment) to document the treatment process(es).

MATERIALS

Water quality control officer's equipment, research logs, motion picture/ still photography cameras and videotape equipment, audiotape recorders, community resource site(s) (etc).

Foran, J. A. "Clean Water, But Not Clean Enough," **Issues in Science and Technology**, Winter 1993-1994

Mitchell, J. G. "Our Polluted Runoff," **National Geographic**, v189n2, February 1996

STUDENTS CONDUCT A CONTROLLED ENVIRONMENT EXPERIMENT

Create two identical *enclosed* plant environments -- using 30-40 gallon fish tanks as containers.

Identical maintenance/care-for both *enclosed* plant environments -- data is recorded in research logs.

Periodically, smoke is introduced into only one (1) *enclosed* plant environment -- data is recorded in research logs.

Observe any/all changes that occur to plant life in the smoke-free container over a given period of time -- data is recorded in research logs.

Observe any/all changes that occur to plant life in the smoke-filled container over a given period of time -- data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment) to document any/all changes to plant life that occur in both the smoke-free and smoke-filled containers over a given period of time.

MATERIALS

Selected flowering/non-flowering plants, potting soil, fertilizer, plant food, watering can(s), fish tanks, cigarette-cigar-burned materials smoke, tubing, sunlight, water, 2 panes of glass as fish tank (container) covers (etc).

ECO-teach Lesson Plan

THEME/TOPIC LAND USE: Policies & Practices

GRADE(S) Grades 9-12

SUBJECT(S) Biology, Botany, Earth Science, Geography, Geology, Government/Civics, History, Mathematics, Sociology

DURATION Five 50-90 minute classes

DATA

Erosion and the ***conversion of prime agricultural farmland to nonagricultural uses*** are cited as ***contributing*** to the ***long-term deterioration*** of our ***natural resource base*** and threatening the ***capacity*** of future ***generations*** to ***produce food*** and ***fiber***.

There is ***concern*** that private owners of land often ***neglect*** ***watershed protection*** and ***wildlife habitat***.

Economically, some land is more ***valuable*** than other ***parcels of land***; more ***biologically productive***; more ***mineral deposits***; better ***location***. Land is ***fixed in quantity***, and it is not ***indestructible***. ***Treating*** land as merely a ***commodity*** rather than as a ***natural resource*** often leads to its ***despoliation***.

Land use policies affect not just the land, but ***crops*** and ***timber*** growing on it, ***wildlife*** protected and ***nurtured*** by it, and the nature of ***commercial, industrial, residential, recreational,*** and often ***facilities*** constructed on it. The ways in which our ***physical environment*** -- and particularly the land -- is ***planned*** (or is not planned) greatly influences the ***quality of the environment*** and, indeed, the quality of our lives.

There is concern, among many, that forest service and park service ***policies*** are ***destroying*** the ***national forests.*** ***Burn policies*** are ***designed*** to ***eliminate undergrowth*** -- the materials that ***fuel*** massive fires that destroy millions of ***acres*** or ***hectares*** of ***prime*** timber as well as ***countless*** varies of ***flora*** and ***fauna***. As a result of Man's actions, it is believed that he is creating ***artificial forests***; not ***resembling*** the characteristics of ***old-age forests*** but rather Man's idea of what an ***ideal*** forest should be.

A ***land-use program*** should ***recognize*** and ***maintain*** the ***value*** of a private ***decision-making process***, ***balance economic*** and other considerations, provide for ***compatible use of lands and waters***, put the main ***burden*** on states or ***interstate regions*** to ***execute*** and on the ***federal government*** to ***review*** and ***enforce*** state and regional ***plans***, give ***financial aid***, and balance regional-state-local ***needs*** with the ***national interest(s)***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

natural and man-made causes of land degradation

the value of land

the various uses of land

various land-use/management policies and programs

land-use/management-relations among various levels of government.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

natural and man-made causes of land degradation -- nearby/close to home and distant/far-removed

the value of land that is to be found in the local/area environment(s) the various uses of land -- nearby/close to home

land-use/management policies and programs that apply to the local/area environment(s)

land-use/management -relations that exist among local-county-state-federal levels of government.

LESSON OBJECTIVE(S) Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audiovisual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models)

LESSON ACTIVITIES (Each teacher selects options from the following ***learning encounters menu***)

Introduction

Students view an audiovisual presentation that describes both the ***natural*** and ***man-made*** causes of land degradation

Students view an audiovisual presentation that discusses the value of land -- as determined by human beings

Students view an audiovisual presentation that describes Man's various uses of land

Students view an audiovisual presentation that describes various land-use/management policies and programs instituted by local-county-state-federal governments

Students view an audiovisual presentation that explains why Man must conserve/manage and protect the land -- nearby/close to home and distant/far-removed

Guest speakers discuss: natural and man-made causes of land degradation -- nearby/close to home and distant/far-removed, the differing values assigned to land -- nearby/close to home and distant/far-removed, various uses Man makes of land -- nearby/close to home and distant/far-removed, land-use/management policies and programs -- nearby/close to home and distant/far-removed, reasons why Man must conserve/manage and protect the land -- nearby/close to home and distant/far-removed

Students go on field trips to natural and ***built*** environments and observe ways that land is used by Man, Man's impact upon the land (positive/negative), criteria used by Man to determine the value of various parcels of land, evidence of land-use/management programs, and learn why it is important to wisely conserve/manage and protect the land -- for today and for the future

Students conduct research at local/area natural and ***built*** environment sites

Students bring newspaper/magazine articles to class and discuss: land degradation, land valuation, land-use/management practices, land conservation and stewardship

Students watch theme/topic-related ***live*** news events or documentaries on cable television.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: land degradation, land valuation, land-use/management policies and programs, land conservation and stewardship

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate land degradation sites, parcels of land having various value -- as determined by Man, land-use/management program sites, land conservation/stewardship sites

Students collect data on film/videotape while on field trips -or- conducting research at field-based sites in the local/area lifespace environment(s)

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: land degradation, land valuation, land use, land conservation/stewardship

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying causes of land degradation, the value of different parcels of land, Man's various uses of land, land-use/management policies and practices, land conservation/stewardship efforts

Students write essays about their impressions of : the causes-and-effects of land degradation, ways by which Man determines the value of different parcels of land, ways Man uses land, land-use/management efforts, reasons why land conservation/stewardship is important.

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS, CNBC

The DISCOVERY Channel

National Geographic:

special issue: **Making Sense of the Millennium**
v193n1 January 1998

"Canyon Country," v196n1, July 1999, p 94-109

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books

INTERNET

www.epa.gov (Environmental Protection Agency)

www.blm.gov (Bureau of Land Management)

www.wri.org (World Resources Institute)

www.tnc.org (The Nature Conservancy)

www.usgs.gov (U.S. Geological Survey)

www.fs.fed.us (USDA Forest Service)

www.conservationfund.org (Conservation Fund)

www.nrdc.org (Natural Resources Defense Council)

www.americanforests.org (American Forests)

www.edf.org (Environmental Defense Fund)

www.sierraclub.org (Sierra Club)

www.doi.gov (U.S. Department of the Interior) www.law.du.edu/rmlui (The Rocky Mountain Land Use Institute)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about: causes-and-effects of land degradation, the value of land -- as determined by Man, land use practices, land-use/management policies and programs, land conservation/stewardship efforts

talking about: causes-and-effects of land degradation, the value of land -- as determined by Man, land use practices, land-use/management policies and programs, land conservation/stewardship efforts

writing about: causes-and-effects of land degradation, the value of land -- as determined by Man, land use practices, land-use/management policies and programs, land conservation/stewardship efforts

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

maintaining a portfolio -- evidence of achievement and knowledge/skills development over time

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts&crafts objects

Create original drawings/paintings

Make visual displays

WEB SITE RESOURCES FOR TEACHERS

www.secondnature.org (Second Nature)

www.nationalgeographic.com/maps	(National Geographic Society)
www.askeric.org	(AskERIC)
www.art.man.ac.uk	(Centre for Urban and Regional Ecology)
www.globalstewards.org	(Global Stewards)
www.wcmc.org.uk	(World Conservation Monitoring Centre)
www.earthsystems.org	(Earth Systems)
www.uli.org	(Urban Land Institute)
www.townscape-inst.com/index.html	(The Townscape Institute)
www.planning.org	(American Planning Association)
www.trailsandgreenways.org	(Trails and Greenways)
www.communities-by-choice.org	(Communities by Choice)
www.wildrockies.org/picturetomorrow	(Wild Rockies)
www.scenic.org	(Scenic America)
www.geologylink.com	(Geology Link)
www.americanlands.org	(American Lands Alliance)
www.clues.abdn.ac.uk:8080	(Centre for Computer Based Learning in Land Use and Environmental Studies)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: LAND USE

STUDENTS ATTEND PUBLIC HEARINGS

Attend local/area land use planning, zoning, economic development hearings -- record data in research logs.

Analyze local/area maps re: land use planning, zoning, economic development (etc) -- record data in research logs.

Take field trips -- to proposed land development, zoning (etc) sites and record data on film/videotape -- using graphic media devices.

Create land use visual displays.

Create land use-related audiovisual presentations -- to be presented to community groups.

MATERIALS

Graphic media devices, research logs, maps, community resource sites, construction paper, poster board, paint, stapler/staples, overhead projector transparency sheets, transparency markers (etc).

Klinkenborg, N. "A Farming Revolution: Sustainable Agriculture," ***National Geographic*** December 1995

STUDENTS CONDUCT HISTORICAL STUDY

Research primary and secondary sources -- to determine local/area histories re: land use and economic development. Data is recorded in research logs.

Use maps to determine the geographical location of economic development sites and locations where various local/area natural resources were found. Data is recorded in research logs.

Take field trips -- to local/area sites where historic events occurred re: land use, harvesting various natural resources, economic development (etc).

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on field trips.

Create a series of visual displays to accompany the theme: THE HISTORY OF OUR COMMUNITY.

Create audiovisual presentations (e.g., films, filmstrips, slides, slide/tape presentations, videos).

MATERIALS

Primary sources (e.g., letters, maps, newspaper articles, photographs, diaries and journals, documents) secondary sources (e.g., books, magazines, documentaries), maps, local historical society (people and resources), graphic media devices, community resource sites (etc).

Pimentel, D. "Environmental and Economic Costs of Soil Erosion," ***Science***. v267, February 1995

ECO-teach Lesson Plan

THEME/TOPIC	Sustainable Development
GRADE(S)	Grades 9-12
SUBJECT(S)	Biology, Botany, Earth Science, Economics, Geography, History, Sociology
DURATION	Five 50-90 minute classes

DATA

MAN & NATURE are ***inextricably linked***; each having positive and negative effects upon the other. The ***natural environments*** of air, water, land and their associated ***biological communities*** and ***chemical processes*** are ***characterized*** by ***complexity*** and more or less ***random change***.

In the final ***analysis*** our concern with ***environmental quality*** stems from its short and ***long-term effects*** on people and the things they ***value***. There exists a relationship between two ***interconnected systems***; the ***economy*** and the ***ecosystem***.

The ***economy*** is a ***social institution*** by which human beings ***determine*** who will do what ***work***, what they will ***produce***, how they will produce it, and who will ***consume*** or use different parts of the ***product***.

The ***ecosystem*** consists of the ***relationships*** between ***living organisms*** and their ***environments.***

When ***protection of the environment*** is considered in the ***context*** of the rising ***demands*** made upon it by a ***society*** which is growing in numbers and in ***consumption*** needs it is inevitable that one seeks to find a ***balance*** between ***ecology*** and ***development***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the ***link*** between MAN & NATURE

the need to ensure the quality of natural and ***built*** environments

the impact of increasing human numbers on Earth's ecosystem

the impact of Man's ***built*** environments on Earth's ecosystem

the need to find a balance between ecology and development.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the ***link*** between MAN & NATURE that exists nearby/close to home and distant/far-removed

efforts to ensure the quality of natural and ***built*** environments -- nearby/close to home and distant/far-removed

evidence of the impact of increasing human numbers on Earth's ecosystem -- nearby/close to home and distant/far-removed

evidence of the impact of Man's ***built*** environments on Earth's ecosystem -- nearby/close to home and distant/far-removed

efforts to find a balance between ecology and development -- nearby/close to home and distant/far-removed.

LESSON OBJECTIVE(S) Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, matrix data, audiovisual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models, artifacts).

LESSON ACTIVITIES (Each teacher selects from the following options)

Introduction

Students view an audiovisual presentation that examines the ***inextricable link*** between MAN & NATURE -- nearby/close to home and distant/far-removed

Students view an audiovisual presentation that examines efforts made by Man to ensure the qulaity of natural and ***built*** environments -- nearby/close to home and distant/far-removed

Students view an audiovisual presentation that presents evidence of the negative impact that increasing human numbers have had/continue to have upon Earth's ecosystem-- nearby/close to home and distant/far-removed

Students view an audiovisual presentation that describes the impact of Man's ***built*** environments on Earth's ecosystem -- nearby/close to home and distant/far-removed

Students view an audiovisual presentation that describes Man's efforts to find a balance between ecology and development -- nearby/close to home and distant/far-removed

Guest speakers discuss: the link between MAN & NATURE, environmental quality, increasing human numbers and the problems that creates for natural and ***built*** environments, man-made development (***built*** environments) and its impact upon natural environments, efforts to strike a balance between ecology and development

Students go on field trips to natural and ***built*** environments and observe existing conditions -- seeking evidence of Man's impact upon Nature and his own well-being (positive and/or negative examples)

Students conduct research at local/area natural and ***built*** environments

Students bring newspaper/magazine articles to class and discuss: the link between MAN & NATURE, Man's impact upon Nature, efforts to strike a balance between ecology and development

Students watch theme/topic-related ***live*** news events or documentaries on cable television

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: the link between MAN & NATURE, Man's positive/negative effects upon Earth's ecosystem, man-made development, efforts to strike a balance between ecology and development

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate sites that evidence Man's positive/negative effects upon Earth's ecosystem, examples of man-made development, efforts to strike a balance between ecology and development

Students collect data on film/videotape while on field trips -or- conducting research at field-based sites in the local/area lifespace environment(s)

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: human population numbers, man-made development, stress upon Earth's ecosystem, Man's efforts to strike a balance between ecology and development

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying human population growth and distribution -- nearby/close to home and distant/far-removed, the effects of man-made development on Earth's ecosystem, efforts to strike a balance between ecology and development

Students write essays about their impressions of Man's impact upon Nature, the link between MAN & NATURE, efforts to strike a balance between ecology and development; the creation of **Cooperative Living Habitats**

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS

The DISCOVERY Channel

National Geographic:

special issue: **Making Sense of the Millennium**
v193n1 January 1998

special issue: **Global Culture**
v196n2 August 1999

"The Dawn of Humans: Redrawing Our Family Tree?"
v194n2, August 1998, p 90-99

"The Dawn of Humans: New Finds in South Africa,"
v197n5, May 2000, p 76-83

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books

INTERNET

www.sierraclub.org	(Sierra Club)
www.outdoors.org	(Applachian Mountain Club)
www.epa.gov	(Environmental Protection Agency)
www.janegoodall.org	(The Jane Goodall Institute)
www.wri.org	(World Resources Institute)
www.tnc.org	(The Nature Conservancy)
www.usgs.gov	(U.S. Geological Survey)
www.fs.fed.us	(USDA Forest Service)
www.nationalgeographic.com	(National Geographic)
www.phe.rockefeller.edu	(The Program for the Human Environment)
www.wilderness.org	(The Wilderness Society)

www.amrivers.org (American Rivers)

www.foe.org (Friends of the Earth)

www.globalstewards.org (Global Stewards)

www.sustainable.doe.gov (U.S. Department of Energy)

www.americanforests.org (American Forests)

www.cde.unibe.ch/index.html (Centre for Development and Environment)

www.earthhopenetwork.net (Earthhope Action Network)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about: the inextricable link between MAN & NATURE, human population growth and distribution, Man's positive/negative effects upon Earth's ecosystem, efforts to balance ecology and man-made development

taking about: the inextricable link between MAN & NATURE, human population growth and distribution, Man's positive/negative effects upon Earth's ecosystem, efforts to balance ecology and man-made development

writing about: the inextricable link between MAN & NATURE, human population growth and distribution, Man's positive/negative effects upon Earth's ecosystem, efforts to balance ecology and man-made development

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape recorders) to collect data

using the Internet to collect data

notetaking

map making

maintaining a portfolio -- evidence of achievement and knowledge/skills development over time

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts&crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

www.secondnature.org	(Second Nature)
www.askeric.org	(AskERIC)
www.ericse.org	(ERIC Clearinghouse for Science, Mathematics and Environmental Education)
www.eb.com	(Explore Britannica)
www.ngstore.com	(National Geographic Society)
www.earthsystems.org	(Earth Systems)
www.doi.gov	(U.S. Department of the Interior)
www.ulb.ac.be/ceese	(Center for Economic and Social Studies on the Environment)
ice.ucdavis.edu	(Information Center for the Environment)
www.ewg.org	(Environmental Working Group)
www.popplanet.org	(Population Reference Bureau)
www.zpg.org	(Zero Population Growth)
www.applysd.co.uk	(Applying Sustainable Development)
www.greenkeepers.com	(Greenkeepers)
www.dupont.com	(DuPont Corporation)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: SUSTAINABLE DEVELOPMENT

STUDENTS INVESTIGATE THE NON-AGRICULTURAL USE OF PRIME AGRICULTURAL LAND

Take a field trip(s) -- to agricultural area(s) to observe ways by which highly productive (high yield) acreage is being used (for non-agricultural purposes) in the local/area communities. Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Meeting(s) with farmers, business representatives, land developers, contractors, county extension service representative(s) (etc). Record data in research logs. Understand reasons why prime farmland is being used for non-agricultural purposes as well as the possible future effects of the loss of high yield crop land on the economic well-being of the region.

Research -- the national and international trend to convert high yield crop land to other uses, the impact that increasing human numbers has upon Earth's capacity to sustain life, the impact of increasing human numbers has upon Man's ability to grow/harvest additional crops for human/non-human consumption.

Create visual displays and audiovisual presentations.

MATERIALS

Community resource site(s), community resource people, graphic media devices, research logs, encyclopedias, atlases & maps, Internet web sites, CD-ROM software, newspapers & magazines (etc).

Bongaarts, J. "Can the Growing Human Population Feed Itself?" ***Scientific American*** March 1994

Cohen, J. E. "Population Growth and Earth's Human Carrying Capacity," ***Science*** v269 July 1995.

Pimm, S. L. "Food Web Patterns and Their Consequences," ***Nature*** v350 April 1991

Reganold, J. P. "Sustainable Agriculture," ***Scientific American***, June 1990

STUDENTS INVESTIGATE ENVIRONMENTAL DEGRADATION

Read about -- instances of environmental degradation in the local/area communities as a result of ***built*** environment development/expansion into pristine natural areas. Record data in research logs.

Take a field trip -- to degraded site(s) to observe ways in which Man's actions have caused an irreversible environmental disaster(s). Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on a field trip.

Periodically -- revisit the degraded site(s) to observe any/all changes made to the immediate/surrounding area(s). Record data in research logs and on film/videotape as well as on audiotape.

Meeting(s) with community leaders, community residents, business representatives, conservation & environmental group representatives, forest service representatives (etc). Record data in research logs and on audiotape.

Create visual displays and audiovisual presentations.

MATERIALS

Community resource site(s), community resource people, graphic media devices, research logs, maps of the local/area communities, encyclopedias, dictionaries, newspapers & magazines (etc).

Frosch, R. A. "Industrial Ecology: Adapting Technology for a Sustainable World," ***Environment*** v37n10 December 1995

ECO-teach Lesson Plan

THEME/TOPIC	Conservation & Stewardship
GRADE(S)	Grades 10-12
SUBJECT(S)	Biology, Botany, Earth Science, Geography, History, Sociology
DURATION	Five 50-90 minute classes

DATA

Man is the only ***species*** that has been able to ***adapt*** the ***environment*** to his ***needs***, instead of being adapted by the slow ***process*** of ***natural selection*** to fit the environment.

This rapid ***adaptation*** has been achieved through ***innovations*** such as housing, clothing, and ***agriculture*** -- but with these changes in the environment, the ***balance of nature*** has been upset. Animals and plants that have been of great value to humans are disappearing forever. ***Biodiversity*** -- the ***ecosystems***, species, and ***genes*** that together make life on earth possible -- is ***collapsing*** at an ***astounding rate***. As we ***eliminate*** each species that stands in our way today, we lose any hope of having it back tomorrow.

Man's ***influence*** on the ***quality of the environment*** depends on two things: the ***damage*** he does and the ***effort devoted*** to ***undoing*** that damage. ***Mankind***'s entire ***future*** may depend upon our understanding of the ***fundamental relation*** between ***complexity*** and ***stability*** in ***ecological systems***. MAN & NATURE are inextricably linked. In order to ***sustain*** ourselves as a post-industrial ***society*** we have to recognize that only through ***a process of 'green development'*** will it be possible to ***arrest*** the ***decline*** in environmental quality.

We now are beginning to ***realize*** that the earth, the oceans, and the ***atmosphere*** are ***finite***. ***Conservation*** can be defined as the ***management*** of the ***biosphere*** -- in order to ***yield*** the greatest ***sustainable*** benefit. Conservation has three (3) ***basic objectives***: to ***maintain essential ecological processes*** and ***life support systems***; to ***preserve genetic diversity***; and to ***ensure*** that the ***utilization*** of ***natural resources*** and ecosystems is ***sustainable***.

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

Man's cultural and economic development throughout history

Man's positive and adverse effects upon the natural environment -- as a result of his cultural and economic development

Man's inextricable link with Nature

Man's efforts to conserve and manage natural resources

Man's efforts to wisely manage the ***harvesting*** and use of ***renewable*** and ***nonrenewable*** resources.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

evidence of Man's cultural and economic development in the local/area environment(s)

evidence of Man's positive and adverse effects upon the local/area environment(s) -- as a result of his cultural and economic development

evidence of the inextricable link between MAN & NATURE to be found in the local/area environment(s)

evidence of Man's efforts to conserve and manage natural resources -- in the local/area environment(s) evidence of Man's efforts to wisely manage the ***harvesting*** and use of ***renewable*** and ***nonrenewable*** resources -- in the local/area environment(s).

LESSON OBJECTIVE(S)

Students will:

define selected vocabulary and incorporate words/terms into sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups

create a variety of presentations to the class (e.g., oral reports, written reports, audio-visual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models, historic artifacts).

LESSON ACTIVITIES (Each teacher selects from the following options)

Introduction

Students view an audiovisual presentation chronicling Man's cultural and economic development

Students view an audiovisual presentation that discusses Man's positive and negative effects/impact upon the natural environment -- as a result of his cultural and economic development

Students view an audiovisual presentation which discusses the ***inextricable link*** between MAN & NATURE

Students view an audiovisual presentation which describes Man's efforts to conserve and manage natural resources

Students view an audiovisual presentation which describes Man's efforts to wisely manage the ***harvesting*** and use of ***renewable*** and ***nonrenewable*** resources

Guest speakers discuss: Man's cultural and economic development -- nearby/close to home and distant/far-removed, Man's positive and negative effects/impact upon the natural environment -- nearby/close to home and distant/far-removed, the inextricable link between MAN & NATURE -- nearby/close to home and distant/far-removed, Man's efforts to conserve and manage natural resources as well as wisely manage the harvesting and use of renewable and nonrenewable resources -- nearby/close to home and distant/far-removed

Students go on field trips into the local/area environment(s) to observe examples of Man's cultural and economic development, his effects upon the natural environment, the link between man and nature, and/or the conservation/management/use of renewable and nonrenewable resources

Students conduct research studies in local/area natural and ***built*** environments

Students bring newspaper/magazine articles to class and discuss: cultural/economic development, Man's impact upon Nature, the link between MAN & NATURE, the conservation/management/use of natural resources

Students watch theme/topic-related ***live*** news events or documentaries on cable television.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: Man's cultural and economic development, his impact upon Nature, the link between MAN & NATURE, the conservation/management/use of natural resources

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected cultural/economic development sites OR natural resources areas OR examples of Man's positive or negative effects/impact upon Nature. Data is recorded on desktop outline maps

Students collect data on film/videotape while on field trips -or- conducting research at field-based sites in the local/area lifespace environment(s)

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: areas/regions of Man's cultural and/or economic development, natural resources regions, locations which give evidence of Man's positive and/or negative effects/impact upon natural environments

The teacher uses historic artifacts, timelines, CD-ROM software (etc) to teach a lesson about Man's cultural and/or economic development -- nearby/close to home and distant/far-removed.

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying Man's cultural and economic development, natural resources locations, the link between MAN & NATURE, the conservation/management/use of natural resources

Students write essays about their impressions of Man's cultural and economic development, natural resources, the link between MAN & NATURE, and the conservation/management/use of natural resources

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **National Geographic EXPLORER** on TBS

Jack Hanna's ANIMAL ADVENTURES (television syndication)

The DISCOVERY Channel

National Geographic:

special issue: **Making Sense of the Millennium**
v193n1 January 1998

"Canyon Country," v196n1, July 1999, p 94-109

"The Shrinking World of Hornbills," v196n1
July 1999, p 52-71

"Madidi," v197n2, March 2000, p 2-23

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras, still photography cameras (35mm), videotape equipment -- as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.wilderness.org (The Wilderness Society)

www.greenpeace.org (Greenpeace)

www.conservation.org (Conservation International)

www.defenders.org (Defenders of Wildlife)

www.dir.yahoo.com/Society_and_Culture/Environment_and_Nature/Conservation

www.foe.org (Friends of the Earth)

www.eb.com (Explore Britannica)

www.wildsanctuary.com (Wild Sanctuary)

www.globalstewards.org ((Global Stewards)

www.webcom.com/`iwcwww (International Wildlife Coalition)

www.conservationfund.org (Conservation Fund)

www.iwla.org (Izaak Walton League)

www.epa.gov (Environmental Protection Agency)

www.csf.colorado.edu/consbio (Conservation Biology)

www.sdsc.edu/ESA/esa.htm (The Ecology Society of America)

www.ser.org (Society for Ecological Restoration)

www.tnc.org (The Nature Conservancy)

www.fs.fed.us (USDA Forest Service)

www.nfwf.org (National Fish & Wildlife Federation)

www.ecostewards.org (World Stewardship Institute)

www.sustainableusa.com (SUNetwork)

www.rri.org/home.html (Resources Renewal Institute)

www.home.beseen.com/community (Cedar Creek Wildlife Project)

www.greenkeepers.com (Greenkeepers)

www.earthwatch.org (Earth Watch)

www.npca.org (National Park Conservation Association)

www.wwf.org (World Wildlife Fund)

www.earthhopenetwork.net (Earthhope Action Network)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about Man's cultural and economic development, Man's positive and negative effects/impact upon the environment, the inextricable link between MAN & NATURE, Man's conservation/management/use of renewable and nonrenewable natural resources

talking about Man's cultural and economic development, Man's positive and negative effects/impact upon the environment, the inextricable link between MAN & NATURE, Man's conservation/management/use of renewable and nonrenewable natural resources

writing about Man's cultural and economic development, Man's positive and negative effects/impact upon the environment, the inextricable link between MAN & NATURE, Man's conservation/management/use of renewable and nonrenewable natural resources

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video tape equipment) to collect data

using the Internet to collect data

notetaking

map making

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions
Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts & crafts objects

Create original drawings/paintings

WEB SITE RESOURCES FOR TEACHERS

www.ericse.org	(ERIC Clearinghouse for Science, Mathematics and Environmental Education)
www.earthsystems.org	(Earth Systems)
www.wcmc.org.uk	(World Conservation Monitoring Centre)
www.emagazine.com	(Emagazine)
www.enn.com	(Environmental News Network)
www.unep.ch	(United Nations Environment Programme)
www.askeric.org	(AskERIC)

www.aeoe.org	(Association for Environmental & Outdoor Education)
www.projectwild.org	(Council for Environmental Education)
www.earthforums.com	(Earth Conscious Directory)
www.ecologycenter.org	(Ecology Center)
www.envirocitizen.org	(Center for Environmental Citizenship)
www.iwec.org	(International Wildlife Education & Conservation)
www.lighthawk.org	(Ecosystems)
www.manomet.org/ManWeb	(Center for Conservation Sciences)
www.arborday.org	(The National Arbor Day Foundation)
www.doc.govt.nz	(Department of Conservation in New Zealand)
www.igc.org/citizenalert	(Citizen Alert)
www.ecotopia.com/index.asp	(Ecotopia)
www.library.thinkquest.org	(The Environment: A Global Challenge)
www.australianps.environment.gov.au	(The Australian Alps National Parks)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: CONSERVATION & STEWARDSHIP

STUDENTS ADOPT A COMMUNITY SITE

Identify a natural or ***built*** environment site that requires maintenance or improvement. Data is recorded in research logs.

Take a field trip -- to the selected community site to observe the conditions and/or situation. Data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip.

Meet with community leaders, representatives of environmental groups, neighborhood groups (etc) to plan a course-of-action regarding the maintenance or improvement of the selected site. Data is recorded in research logs.

Field-based projects include: conduct a clean-up campaign, maintain the existing condition of the selected site, create a nature trail system, create a wildlife sancturary, beautify a section of a neighborhood, plant flowers and/or trees (etc). Data is recorded in research logs.

BEFORE-DURING-AFTER photographs of site activities -- presented as a visual display.

At nature sites -- periodically observe conditions; noting any/all changes. Data is recorded in research logs. Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds.

MATERIALS

A physical site (natural or ***built*** environment), graphic media devices, rakes, brush trimmers, hammers, paint/paint brushes, trash cans, large heavy duty plastic trash bags, gloves, safety glasses, canteens & water bottles, compasses, flowering plants & trees (etc).

Beardsley, T. "Recovery Drill," ***Scientific American***
November 1990

STUDENTS PERFORM COMMUNITY SERVICE

Volunteers -- at a wildlife sanctuary, with the county or state park service, with the county or state wildlife service, with private conservation groups, with local/county beautification projects, with the local/county recreation services department (etc). Data is recorded in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while doing volunteer work in the community.

Visit lower elementary grades classrooms and special education classrooms -- to discuss volunteer activities, to show visual displays, and to make audio-visual presentations.

MATERIALS

Community resource sites, community resource groups/organizations, graphic media devices, research logs (etc).

Holloway, M. "Managing Planet Earth," ***Scientific American*** September 1989

ECO-teach Lesson Plan

THEME/TOPIC	Understanding the Hydrosphere
GRADE(S)	Grades 10-12
SUBJECT(S)	Biology/Marine Biology, Earth Science, Geography, Marine Science, Oceanography
DURATION	Five to Ten 50-90 minute classes

DATA

The ***hydrosphere*** contains all the water on the ***surface of the earth*** -- from the smallest pond to the largest ocean.

The hydrosphere contains:

bays - large parts of a sea or lake that identifies the ***shoreline***, and around which the land forms a curve

brooks - small streams with ***flowing water***

creeks - small streams, larger than brooks, which are ***recesses*** in the ***shore*** of a sea or river

coves - small ***inlets***, creeks, or bays; ***sheltered*** recesses

estuaries - inlets or arms of seas; parts of ***seacoasts*** over which the ***tide ebbs and flows***

gulfs - large ***areas*** of water ***extending*** from oceans or seas into ***coastlines***

harbors - bays or inlets of seas

inlets - small bays or narrow strips of water extending into ***bodies of land*** from seas or lakes

lakes - ***inland bodies of water***, usually ***fresh water***, ***formed*** by ***glaciers***,

river drainage -- larger than pools or ponds

oceans - the largest bodies of ***salt water*** that ***cover*** more than two-thirds of the earth's ***surface***. There are five principal ***geographical divisions*** of these great bodies of salt water: ***Atlantic Ocean, Pacific Ocean, Indian Ocean, Arctic Ocean, Antarctic Ocean***

ponds - bodies of ***standing water*** that are smaller than lakes

pools - small ponds or deep, ***still spots*** in rivers

rivers - ***natural flows of water;*** larger than creeks and ***emptying*** into oceans, lakes, or other rivers

seas - large bodies of salt or fresh water that are ***wholly*** or ***partly enclosed*** by land

streams - ***currents*** or ***flows*** of ***running water*** along the ***surface*** of the earth

wetlands - A ***category*** of water areas found inland and along coastlines

- ***bogs*** - ***quagmires*** (***wet spongy ground***) covered with grass or other plants

- ***marshes*** - ***lowlands***; very wet and ***miry*** or ***overgrown*** with ***coarse grass*** or ***sedge***

- ***swamps*** - ***low ground*** (***spongy lands***) filled with water

The deepest spot in the Earth's ocean is the ***Mariana Trench*** (Pacific Ocean). It is approximately 11,000 ***meters*** or 36,000 ***feet*** from the ***surface***. The ***topography*** of the oceans' ***floor*** is ***similar*** to that of Earth's dry land (***lithosphere***); ***mountain ranges, hot springs, volcanoes, plains.***

As is true regarding Earth's ***atmosphere***, the hydrosphere has been ***contaminated*** by various ***types of man-made pollution***: garbage, human and animal sewage, chemical wastes, radioactive materials, heated water discharged from nuclear power plants, fertilizers.

In the past, ***dangerously high levels*** of ***mercury*** were discovered in ***deep sea water tuna fish*** and ***swordfish***. Coastal areas that were once ***highly productive shellfish beds*** (***clams*** and ***oysters***) have been declared ***off-limits*** -- due to contamination from ***medical wastes, sewage, garbage, oil spills*** (etc).

UNIT GOAL(S)

As a result of research-oriented investigations, students will understand and appreciate:

the diverse nature and characteristice of Earth's hydrosphere

Man's varied relationships with the hydrosphere

Man's dependent upon the hydrosphere for food

Man's dependent upon the hydrosphere for drinking water

the topography of the oceans' floor

the plight of a contaminated hydrosphere

Man's efforts to save the hydrosphere from irreversible damage.

LESSON GOAL(S)

As a result of classroom and field-based activities, students will understand and appreciate:

the diverse nature and characteristics of Earth's hydrosphere (fresh water & salt water) to be found in the local/area environment(s)

the diverse nature and characteristics of Earth's hydrosphere -- distant/far-removed

Man's varied relationships with the hydrosphere -- nearby/close to home and distant/far-removed

Man's dependence upon the hydrosphere for food and drinking water -- nearby/close to home and distant/far-removed

Man's efforts to remedy the plight of Earth's hydrosphere -- nearby/close to home and distant/far-removed.

LESSON OBJECTIVE(S)

Students will:

define selected vocabulary and incorporate words/terms into conversations, discussions, sentences, paragraphs, essay test item responses, written reports, poems, short stories (etc)

use a variety of print/nonprint materials, CD-ROM software, Internet web sites and collect data for presentations to the class

interact with community resources (people, places, things, events, processes) and collect data for presentations to the class

conduct field-based research and collect data for presentations to the class -- using *graphic media devices* to record data on film/tape (***ecography***)

work cooperatively in small research groups create a variety of presentations to the class (e.g., oral reports, written reports, audio-visual essays, power point presentations)

create visual displays (e.g., bulletin boards, murals, timelines, overhead projector transparencies, matrices, diaramas, models)

LESSON ACTIVITIES (Each teacher selects options from the following ***learning encounters menu***)

Introduction

Students view an audiovisual presentation that describes Earth's hydrosphere -- fresh water and salt water

Students view an audiovisual presentation that describes Man's relationships with Earth's hydrosphere

Students view an audiovisual presentation that describes Man's dependence upon Earth's hydrosphere for food and drinking water

Students view an audiovisual presentation that chronicles Man's pollution of Earth's hydrosphere -- fresh water and salt water

Students view an audiovisual presentation that describes types of life that exists in fresh water and/or salt water

Students view an audiovisual presentation that describes Man's efforts to save Earth's hydrosphere from further contamination by human and animal wastes

Students view an audiovisual presentation that chronicles Man's research efforts -- in order to map the ocean's floor, to discover forms of fresh water and salt water plant and animal life (e.g., mammals, fish, reptiles, amphibians, mollusks), to study the migration routes of species, to study the overall ***health*** of the hydrosphere (etc)

Guest speakers discuss: the Earth's hydrosphere -- and its importance in Nature's ecosystem and to the survival of Mankind, specific types of fresh water and/or salt water resources to be found nearby/close to home, the underwater exploits of Jacques Cousteau and his research teams, types of fresh water and salt water plant/animal life, the contamination of fresh water and salt water by Man, Man's efforts to ***clean up*** the Earth's hydrosphere (etc)

Students go on field trips to ponds, creeks, streams, rivers, lakes, coves, bays, bogs, marshes, swamps, coastal seashores (etc) to observe: the physical structure of these areas, types of plant and/or animal life, evidence of Man's pollution, efforts to ***clean up*** bodies of water (etc)

Students conduct research at field-based sites (e.g., ponds, creeks, streams (etc), aquariums, museums of natural history, National Seashore displays and nature paths, museums of science, state seashore parks and preserves, research facilities)

Students bring newspapers/magazines to class and discuss: Earth's hydrosphere, hydrosphere pollution, fresh water and salt water life forms, hydrosphere research, Man's exploitation of hydrosphere resources, Man's legal battles over control of supplies of fresh (drinking) water (etc)

Students watch theme/topic-related ***live*** news events or documentaries on cable television.

Teaching/Learning (Guided Practice)

A discussion of the audiovisual presentation(s) -- with related notetaking

A discussion of the ***live*** news events or documentaries viewed on cable television -- with related notetaking

Students read about: Earth's hydrosphere, fresh water and salt water plant and animal life, the contamination of the hydrosphere, efforts to ***clean up*** the hydrosphere, anti-pollution laws and law enforcement efforts, hydrosphere research, overfishing activities, wanton killing of whales and other sea creatures, Man's destruction of wetlands, off-shore drilling, oil spills (etc)

Working in small groups, students use dictionaries to define key vocabulary words/terms

Working in small research groups, students use atlases-wall maps-globes and/or state highway maps to locate selected oceans and seas, rivers, lakes (etc). Data is collected on desktop outline maps

Students collect data on film/videotape while on field trips -or- conducting research at selected field-based sites

The teacher uses atlases, maps, globes, CD-ROM software, overhead projector transparencies (with overlays) (etc) to teach a geography lesson about: Earth's oceans and seas, selected lakes, rivers, bays, gulfs (etc).

Closure

Students create visual displays related to things seen while on field trips -or- conducting research at field-based sites

Discussions of what was observed/learned while studying: Earth's hydrosphere, forms of fresh water and salt water plant/animal life, Man's contamination of the hydrosphere, Man's exploitation of hydrosphere resources (etc)

Students write essays about their impressions of: fresh water and/or salt water sites, hydrosphere life forms, Man's pollution of fresh water and/or salt water supplies, Man's exploitation of hydrosphere resources, Man's efforts to ***clean up*** Earth's hydrosphere (etc).

MATERIALS/RESOURCES

Episodes of **Earth Matters** on CNN

Episodes of **Nature** on PBS

Episodes of **National Geographic EXPLORER** on TBS, CNBC

Episodes of **Jacques Cousteau Specials** (television syndication)

The DISCOVERY Channel

National Geographic:

"The Easy Ways of the Altamaha," v193n1, January 1998, p 72-87

"Blue Refuges," v193n3, March 1998, p 2-31

"Testing the Waters Off Rongelap," v193n4, April 1998, p 62-75

"Lure of the Frog-Fish," v194n1, July 1998, p 40-49

"Bottlenose Whales," v194n2, August 1998, p 78-89

"Greenland Sharks," v194n3, September 1998, p 60-71

"Tracking the Anaconda," v195n1, January 1999, p 62-69

"Coral Eden," v195n1, January 1999, p 2-29

"Coral in Peril," v195n1, January 1999, p 30-37

"Under Antarctic Ice," v195n2, February 1999, p 88-99

"Galapagos - Paradise in Peril," v195n4, April 1999
p 2-31

"Galapagos Under Water," v195n4, April 1999, p 32-41

"The Pools of Spring," v195n4, April 1999, p 122-135

"Listening to Humpbacks," v196n1, July 1999, p 110-129

"Tigers in for the Kill," v196n5, November 1999,
p 28-35

"The Florida Keys ..." ***reference to pages 41 - 43:***
The Coral Reef Ecosystem v196n6
December 1999

"Light in the Dark," v197n1, January 2000, p 122-137

"Jelly Bellies," v197n6, June 2000, p 82-101

Films, filmstrips, slides, slide/tape presentations, CD-ROM software, videos

Newspapers and magazines

Internet web sites

Computers

Atlases, maps, globes, overhead projector transparencies

Overhead projector(s)

Television (cable access)

Desktop outline maps

Dictionaries & encyclopedias

Community resources (people, places, things, events, processes)

Graphic media devices (8mm/16mm motion picture cameras,

still photography cameras (35mm), videotape equipment --
as well as audiotape recorders) and film/tapes

Textbooks & trade books.

INTERNET

www.wetlands.ca (The Wetlands Network)

www.amrivers.org (American Rivers)

www.baaction.org (Bay Area Action)

www.coral.org (The Coral Reef Alliance)

www.cbf.org (Chesapeake Bay Foundation)

www.cciw.ca (The Canadian Centre for Inland Waters)

www.acb-online.org (The Alliance for the Chesapeake Bay)

www.endangered.fws.gov (U.S. Fish & Wildlife Service)

www.epa.gov/owow/oceans (Environmental Protection Agency)

www.wef.org (Water Environment Federation)

www.epa.gov/owow/estuaries (Environmental Protection Agency)

www.savebajawhales.com (International Fund for Animal Welfare)

www.oceania.org.au (The Oceania Project)

www.landscouncil.org (The Lands Council)

www.reefrelief.org (Coral Reef Conservation Program)

www.savethemanatee.org (Save the Manatee Club)

www.probys.com/sarasvati (Sarasvati River)

www.wildsanctuary.com (Wild Sanctuary)

www.seaworld.com (Sea World Adventure Parks)

www.reefnet.org (Reef Network)

www.makaha.mic.hawaii.edu80/aquarium (Waikiki Aquarium)

www.keywestaquarium.com (Key West Aquarium)

www.disney.go.com/animals/sea_creatures/manatees (The Living Seas - Epcot)

www.neaq.org (New England Aquarium)

www.nyaquarium.com (New York Aquarium)

www.flaquarium.net (The Florida Aquarium)

www.aquariums.state.nc.us (North Carolina State Aquarium)

www.mote.org (Mote Marine Lab)

www.gulfarium.com (Florida's Gulfarium)

www.tennis.org (Tennessee Aquarium)

ASSESSMENT Students demonstrate acquired knowledge and skills development by:

reading about: Earth's hydrosphere, hydrosphere life forms, hydrosphere pollution, Man's exploitation of hydrosphere resources, marine scientific research, the nature and characteristics of fresh water and salt water bodies (etc)

talking about: Earth's hydrosphere, hydrosphere life forms, hydrosphere pollution, Man's exploitation of hydrosphere resources, marine scientific research, the nature and characteristics of fresh water and salt water bodies (etc)

writing about: Earth's hydrosphere, hydrosphere life forms, hydrosphere pollution, Man's exploitation of hydrosphere resources, marine scientific research, the nature and characteristics of fresh water and salt water bodies (etc)

making oral reports and audiovisual presentations

creating visual displays

working cooperatively in small groups

correctly answering 90% of quiz/test items

asking questions of guest speakers and site guides

using graphic media devices (cameras and video-tape equipment) to collect data

using the Internet to collect data

notetaking

map making

maintaining a portfolio -- evidence of achievement and knowledge/skills development over time.

HOMEWORK (Independent Practice)

Collect articles and news stories from magazines and newspapers

Collect data from watching television programs

Do map activities

Collect data from the Internet

Study for quizzes and tests

Update class notebook

Work on audiovisual presentations

Complete worksheets

Complete end-of-chapter questions

Read assigned text pages and take notes

Write assigned sentences

Write poetry

Compose songs

Make arts&crafts objects

Create original drawings/paintings

Make visual displays

WEB SITE RESOURCES FOR TEACHERS

www.cousteau.org (The Cousteau Society)

www.seaweb.org (Sea Web)

seawifs.gsfc.nasa.gov/Ocean_Planet/HTML/search_educational_materials.html
(Ocean Planet - Smithsonian)

pegasus.cc.ucf.edu/`smm (The Society for Marine Mammalogy)

www.whale.wheelock.edu (Whale Net)

www.vims.edu (Virginia Institute of Marine Science)

www.people.fas.harvard.edu/`goreau (The Global Coral Reef Alliance)

www.ncwatershedcoalition.org (The North Carolina Watershed Coalition)

www.earthwave.org (Earthwave Society)

www.esdim.noaa.gov (National Oceanic and Atmospheric Administration)

www.cms.udel.edu (Oceanic)

www.itc.nl/wres (Water Resources and Environmental Studies)

www.ceh-nerc.ac.uk (Centre for Ecology & Hydrology)

endeavor.des.ucdavis.edu/newcara (California Rivers Assessment)

ECO-teach SUGGESTED PROJECTS

(LEARNING ENHANCEMENT ACTIVITIES)

Lesson Plan: HYDROSPHERE

STUDENTS MAKE A FRESH WATER AQUARIUM

Take a field trip(s) -- to a fresh water site, to a fresh water aquarium, to a fresh water fish hatchery, to a pet store (etc) to observe the 1) surrounding environment, 2) physical structure/composition of the aquatic ecosystem, 3) species of fish-amphibians-mollusks-mammals, 4) species of plants and algae, 5) man-made fish breeding facilities (etc). Record data in research logs.

Use maps to geographically locate the fresh water site(s) visited. Record data on desktop outline maps.

Research fresh water ecosystems. Record data in research logs.

Meeting(s) with county/state *fish&game* officers, conservation and environmental organization representatives, Trout Unlimited representatives, water pollution control officers (etc) -- to understand the characteristics of fresh water environments (including the natural attributes that surround the fresh water ecosystem), to understand the habits of fish and amphibians found in fresh water ecosystems, to understand the cause(s)-and-effects of fresh water habitat/ecosystem degradation (etc). Record data in research logs.

Make a fresh water ecosystem aquarium.

BEFORE-DURING-AFTER photographs of the construction of the aquarium -- presented as a visual display.

Observe fish-amphibians-mollusks (e.g., behavior, feeding habits, society-building, nest building). Record data in research logs and on film/videotape.

MATERIALS

Fish tank(s), fresh water filter system, gallons of water, fish species, amphibians, mollusks, aquatic plants, gravel, different types of food, chemicals, community resource site(s), community resource people, graphic media devices, research logs, atlases & maps, desktop outline maps, encyclopedias, Internet web sites, CD-ROM software, newspapers, magazines (etc).

Abramovitz, J. N. "Freshwater Failures: The Crisis on Five Continents," ***WorldWatch*** v8n5, September-October 1995

Pearce, F. "Poisoned Waters," ***New Scientist*** v148 October 1995

STUDENTS MAKE A SALT WATER AQUARIUM

Take a field trip(s) -- to a salt water site, to a salt water aquarium, to a salt water fish hatchery, to a pet store (etc) to observe the 1) surrounding environment, 2) physical structure/composition of the aquatic ecosystem, 3) species of fish-amphibians-mollusks-mammals, 4) species of plants and algae, 5) man-made fish breeding facilities (etc). Record data in research logs.

Use maps to geographically locate the salt water site(s) visited. Record data on desktop outline maps.

Research salt water ecosystems. Record data in research logs.

Meeting(s) with commercial fishermen, marine biologists, amateur and professional scuba divers, weekend fishermen, coastal waters pollution control officers (etc) -- to understand the 1) characteristics of salt water environments, 2) the habits of fish species-amphibians-mollusks-mammals, 3) the impact of Man's intrusion upon aquatic ecosystems, 4) Man's exploitation of aquatic resources (etc). Record data in research logs.

Make a salt water ecosystem aquarium.

BEFORE-DURING-AFTER photographs of the construction of the aquarium -- presented as a visual display.

Observe fish-amphibians-mollusks (e.g., behavior, feeding habits, society-building, nest building). Record data in research logs and on film/videotape.

MATERIALS

Fish tank(s), salt water filter system, salt compounds, fish species, amphibians, mollusks, different types of food, aquatic plants, gravel, stones, gallons of water, community resource site(s), community resource people, graphic media devices, research logs, atlases & maps, desktop outline maps, encyclopedias, Internet web sites, CD-ROM software, newspapers, magazines, books (etc).

Levine, J. S. "Dusk and Dawn Are Rush Hours on the Coral Reef," ***Smithsonian***, October 1993

Partfit, M. "Diminishing Returns: Exploiting the Ocean's Bounty," ***National Geographic***, November 1995

Platt, A. E. "Dying Seas," ***WorldWatch*** v8n1 January - February 1995

Ray, G. "Marine Biology Diversity," ***BioScience*** July-August 1991

STUDENTS ADOPT A SHORELINE

Take a field trip(s) -- to a fresh water -or- salt water shoreline (e.g., pond, lake, bay, ocean) to observe its condition and characteristics. Record data in research logs.

Use graphic media devices (cameras and videotape equipment as well as audiotape recorders) to collect images and sounds -- while on the field trip(s).

Use maps to geographically locate the shoreline visited. Record data on desktop outline maps.

Meeting(s) with local/county/state/federal water resources officers, the U.S. Coast Guard, fishermen, conservation officers, environmental group representatives (etc) -- to determine ways by which students can help to maintain and/or improve the condition of a selected fresh water or salt water shoreline. Record data in research logs.

Periodic visits to the shoreline -- to conduct a variety of activities (clean-up campaigns, mark trails through sand dunes, release hatchery-raised fingerlings and fish into streams-ponds-lakes-bays (etc). Record data in research logs and on film/videotape.

Create visual displays and audiovisual presentations.

BEFORE-DURING-AFTER shoreline maintenance/improvement photographs -- presented as a visual display.

MATERIALS

Community resource site(s), community resource people, graphic media devices, research logs, atlases & maps, desktop outline maps, Internet web sites, CD-ROM software, encyclopedias, protective gear (e.g., gloves, safety glasses, appropriate footwear), heavy duty plastic trash bags, trash cans (etc).

Pearce, F. "Poisoned Waters," ***New Scientist***, v148 October 1995

Platt, A. E. "Dying Seas," ***WorldWatch*** v8n1, January - February 1995

ABOUT *ECO-teach* LESSON PLANS

The preceding lesson plans are but examples of ways by which classroom teachers can **teach about** - and students can **learn about** 1) Earth's ecosystem, 2) natural environments (biomes) that are nearby/close to home and distant/far-removed, 3) ***built*** environments that are nearby/close to home and distant/far-removed, 4) MAN-NATURE relationships -- past and present, 5) conservation and stewardship strategies designed to sustain *all* forms of life on the planet.

Teachers may add to- or change any aspect(s) of the ***ECO-teach*** lessons as well as create lessons of their own. Each and every teacher, regardless of subjects taught, can help nurture an environmental and social ethic in students. One's imagination is the gateway to exciting teaching-and-learning in classrooms and at field-based sites in the lifespace environment.

LOOKING AHEAD

As we embark upon a new Millennium, we must not forget Man's past transgressions against Nature. We must make a concerted effort to conserve and wisely manage the use of the wealth of Nature; whether the resources are found in the *atmosphere* (clean air), the *lithosphere* (fossil fuels, flora, fauna, minerals), or the *hydrosphere* (clean water).

We must remember one inescapable fact: On Earth, *MAN & NATURE* are inextricably linked; the plight of Nature having a negative impact upon the quality of human life as well as upon Man's very existence as a species.

Our nation's *community assets* (public land-based natural resources which are entrusted to future generations) must not fall prey to senseless and wanton exploitation, and eventual destruction, by a few -- driven by monetary gain -- who would press Nature to the brink of total degradation; resulting in the depletion of nonrenewable resources as well as the extinction of countless species.

Today, we live in a global community -- whether we choose to acknowledge that fact or not. Events occurring nearby/close to home and distant/far-removed (whether motivated by cultural, economic, environmental or political considerations) have an impact, to a lesser or greater degree, upon all our lives. We must be as concerned about the plight of Nature, and of fellow human beings, in remote regions of the world as we are about similar conditions which exist down the street and around the corner.

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Each of us *is responsible* for individual actions when it comes to safeguarding the condition of Nature. Each of us must become *proactive* **in our daily outlook and behavior. To harm Nature, today, will have a negative impact upon all of us -- if not tomorrow then in the not-too-distant future. *Spaceship Earth* is *MAN & NATURE's* common abode. WE CARE FOR OURSELVES -- WHEN WE CARE FOR NATURE !**

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